



**Thermo Scientific™ Orion™**  
Laboratory Products Catalog



**thermo scientific orion**

# laboratory products catalog

• pH • ISE • Dissolved Oxygen • Conductivity • Colorimetry • Turbidity • Spectrophotometry

**Thermo**  
SCIENTIFIC

# What's New!

Unveil a whole new line of Orion products

With over 50 years of innovation and proven performance, Thermo Scientific Orion products provide you a full range of laboratory and on-line water analysis instruments serving markets such as environmental, water and wastewater, power, food and beverage, pharmaceutical and general laboratory.

In this catalog, you will find a comprehensive selection of meters, analyzers, electrodes and solutions that are recognized worldwide and will provide you the security that your quality standards are met.

For a start, here's a little sneak preview.



## Versatility

The meter for today's needs and tomorrow's challenges. The Expandable modular Orion VERSA STAR design gives you the flexibility you need. Starting on page 4.

We have the perfect meter for your application.



## Durability

Now more than ever, the Orion line meets requirements for field applications. The Star A meter kits include robust cases and complete accessories. Starting on page 40.



## Performance

Now combine Orion Ross performance with built-in temperature measurement in one premium glass body electrode. See page 68.





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### Water Quality Specialist Tip

The following icons are designed to help you locate the best product for your application.



**Best, Better, Good**  
Electrode ratings based on the electrode precision



**Best Seller**  
Our most popular customer products



**TRIS Compatible**  
pH electrodes for use with TRIS, protein and sulfide samples (calomel replacements)



**Superior Temperature Control**  
pH electrodes that respond exceptionally well to sample temperature changes



**Lead-Free**  
Environmentally safe electrodes that use lead-free glass, which exceeds the requirements of RoHS



**Compliant with EPA testing methods**



**Compliant with USP requirements**



**Hazardous Materials**  
Additional shipping charges may apply



## Introducing the latest Thermo Scientific Orion Star Meters

Orion VERSA STAR and Star A Meters

The new Orion Star™ A and VERSA STAR™ meters are built on the quality and expertise you've come to expect from the Orion product line. The expanded offering combines the tried-and-true features relied on by many professionals with new features concentrated on making them easier to use and minimizing the time needed to train others or to refer to instructions.



### Orion VERSA STAR Benchtop Series

The Orion VERSA STAR advanced benchtop meter and modules exemplify versatility. Four channels can be configured in any combination. Define the channels as you need them. Some suggestions are: four different parameters for complete multiparameter analysis, two sets of two different parameters for simultaneous dual-parameter testing or even four of the same for really high throughput. The versatility also shows in the large, customizable color display; ability to handle the testing spectrum from simple readings to advanced ISE applications; redesigned electrode holder head and exclusive auto-recognition capability for Orion optical RDO and polarographic DO probes. Orion VERSA STAR meters have all the best features and options to work with any application, even the unexpected.

To complement the new meters, we've kept our specialized, industry-proven meters. The Orion DUAL STAR meters are easy-to-use with two channels for simultaneous measurement. For environments that need non-sparking meters, the Orion Intrinsically-Safe Meters meet that criteria and are US intrinsically-safe rated.

Our 2012 Orion meter offering means no more settling for a meter – get the right fit for your application and testing needs.

Orion Star A320 and A200-series meters offer dependability and are an easy choice if you need a dedicated single or multiparameter meter for accurate and repeatable measurements every day. Built with the testing location in mind, the benchtop meters feature an Orion Star stirrer probe port and include the redesigned electrode holder head. The portable meters are waterproof with an IP67-rated housing and have the option to accept AC power. The large, backlit graphic display shows results with plain language prompts. Exclusive auto-recognition capability for Orion optical RDO and polarographic DO probes lets you choose the best probe for your application, not limiting your probe options. These meters are the ideal choice for any lab, for every sample, every day.

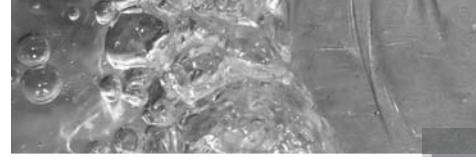
### Orion Star A320 & A200 Series



### Orion Star A100 Series



For simplicity and affordability without sacrificing accuracy, look no further than the Orion Star A100-series meters. These single parameter meters are available in benchtop and portable housings. The simple keypad layout combined with the dedicated onscreen messages help with calibration and setup. Orion Star A100-series meters provide just the core information you need.



| Model (Benchtop Meters)          | Orion VERSA STAR Premium  | Orion DUAL STAR Advanced   | Orion Star A200 Series Advanced                | Orion Star A100 Series Basic   |                              |
|----------------------------------|---|--|--|--|------------------------------|
| Example Display                  |   |  |  |  |                              |
| Display Type                     | Customizable color graphic LCD with step-by-step text prompts   | Graphic LCD with step-by-step text prompts   | Graphic LCD with step-by-step text prompts     | Fixed segment LCD with basic text prompts  |                              |
| Keypad                           | Numeric with menu-specific function keys  | Numeric with menu-specific function keys   | Comprehensive with menu-specific function keys | Simple with highlighted measure key  |                              |
| Number of Channels               | 1 to 4  | 2  | 1 to 2   | 1  |                              |
| Orion Star Stirrer Probe Control | 2   | 1  | 1  | –  |                              |
| Datalog                          | 2000 with date/time   | 1000 with date/time  | 2000 with date/time                            | 50   |                              |
| USB Output                       | 2   | 1  | 1  | –  |                              |
| RS232 Output                     | 1   | 1  | 1  | –  |                              |
| Methods                          | 10 per channel  | 10 per channel   | 10   | –  |                              |
| Parameter                        | pH  | Versa Star 10 meter with pH module<br>Versa Star 80 meter with pH/LogR module<br>Versa Star 50 meter with pH, conductivity modules | Dual Star meter with two pH/ISE channels       | Star A211 pH meter<br>Star A215 pH/conductivity meter<br>Star A216 pH/RDO/DO meter | Star A111 pH meter           |
|                                  | ISE   | Versa Star 40A meter with pH/ISE module<br>Versa Star 40B meter with two pH/ISE modules  | Dual Star meter with two pH/ISE channels       | Star A214 pH/ISE meter   | –                            |
|                                  | Conductivity/TDS/Resistivity/Salinity   | Versa Star 20 meter with conductivity module<br>Versa Star 50 meter with pH, conductivity modules                                  | –  | Star A212 conductivity meter<br>Star A215 pH/conductivity meter                    | –                            |
|                                  | Conductivity, TDS   | –  | –  | –  | Star A112 conductivity meter |
|                                  | RDO Optical & Polarographic Dissolved Oxygen  | Versa Star 30 meter with RDO/DO module   | –  | Star A213 RDO/DO meter<br>Star A216 pH/RDO/DO meter                                | –                            |
|                                  | Polarographic Dissolved Oxygen  | –  | –  | –  | Star A113 DO meter           |
|                                  | pH/ISE/Conductivity/RDO/DO  | Versa Star 90 meter with pH/ISE, conductivity, RDO/DO modules<br>Versa Star 90 meter with two pH/ISE, conductivity, RDO/DO modules | –  | –  | –                            |
| Selectable Meter Components      | Versa Star meter customizable with up to four pH modules<br>• pH • pH/ISE • pH/LogR • Conductivity • RDO/DO | –  | –  | –  |                              |

| Model (Portable Meters) | Orion Star A300 Series Premium                 | Orion Star A200 Advanced   | Orion Star A100 Series Basic              | Orion Intrinsically Safe             |  |
|-------------------------|--|--|---|--------------------------------------|--|
| Example Display         |  |  |   |                                      |  |
| Display Type            | Graphic LCD with step-by-step text prompts     | Graphic LCD with step-by-step text prompts   | Fixed segment LCD with basic text prompts | Fixed segment LCD                    |  |
| Keypad                  | Comprehensive with menu-specific function keys | Comprehensive with menu-specific function keys                                     | Simple with highlighted measure key       | Simple                               |  |
| Number of Channels      | 1 to 3   | 1  | 1   | 100 with date/time (266S, 136S only) |  |
| Datalog                 | 5000 with date/time                            | 1000 with date/time  | 50  | 100 with date/time on select meters  |  |
| USB Output              | 1  | 1  | –   | –                                    |  |
| RS232 Output            | 1  | 1  | –   | 1 (266S, 136S only)                  |  |
| Methods                 | 10   | –  | –   | –                                    |  |
| Parameter               | pH   | Star A321 pH meter<br>Star A325 pH/conductivity meter<br>Star A326 pH/RDO/DO meter | Star A221 pH meter                        | Star A121 pH meter                   | 261S pH meter<br>266S pH meter                     |
|                         | ISE  | Star A324 pH/ISE meter   | –   | –                                    | –  |
|                         | Conductivity/TDS/Resistivity/Salinity          | Star A322 conductivity meter<br>Star A325 pH/conductivity meter                    | Star A222 conductivity meter              | –                                    | –  |
|                         | Conductivity/TDS                               | –  | –   | Star A122 conductivity meter         | 131S conductivity meter<br>136S conductivity meter |
|                         | RDO Optical & Polarographic Dissolved Oxygen   | Star A323 RDO/DO meter<br>Star A326 pH/RDO/DO meter                                | Star A223 RDO/DO meter                    | –                                    | –  |
|                         | Polarographic Dissolved Oxygen                 | –  | –   | Star A123 DO meter                   | –  |
|                         | pH/ISE/Conductivity/RDO/DO                     | Star A329 pH/ISE/conductivity/RDO/DO meter   | –   | –                                    | –  |



## Thermo Scientific Orion VERSA STAR

Advanced Electrochemistry Meter

Visible indicators to quickly show how each of the four channels are assigned

Calibration information with buffer points and electrode slope from last calibration

Function keys that update depending on your screen and shortcut keys on the keypad make this meter easy for anyone to use

Four channels to mix and match in any combination as you need

The large, color graphic display is easy on the eyes and can be seen from any angle

Display information can be customized to show only the information you need



More BIG surprises just for you! Find out on the following pages.

This versatile meter has a large, color graphic LCD display. The informative (and customizable) display shows readings, connections, time, date, sample ID, user ID and calibration information.

### Features and Benefits

- Select from five modules to customize the four channels your way – it's versatile for you to configure how you need it for now or for later
- Anyone can use this meter with its plain language screen prompts, function keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Memory for up to 10 methods per channel allow for customized procedures to differentiate between tests and/or users
- Data transfer and updating meter software is easy with two USB and RS232 ports
- Includes data analysis software for transferring stored results or displaying readings in real-time
- Mix samples without a stir plate with direct control for two Orion Star stirrer probes (096019, sold separately)
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source with the included universal power adapter
- IP54-rated housing handles splashes
- 3 year meter replacement warranty



**A variety of modules that you can place in any of the four channels.**

**• pH/Temperature Module Allows:**

- Up to 6 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Fixing of calibration errors without a complete recalibration with calibration editing

**• Use the pH/ISE/Temperature Module for:**

- All the benefits of the pH module
- Fixing pH/ISE calibration errors without a complete recalibration with calibration editing
- Advanced ISE benefits such as auto-blank, timed end point, linear point-to-point, non-linear selectable auto-blank, low-concentration range stability, ISE ID and incremental techniques

**• Conductivity/Temperature Module Offers:**

- Conductivity, TDS, salinity or resistivity capabilities
- Selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C with linear, non-linear, nLFu or USP/EP curve options for conductivity
- Choice of practical salinity or natural sea water curves for salinity readings
- Linear or ISO/EN 27888 curves for TDS

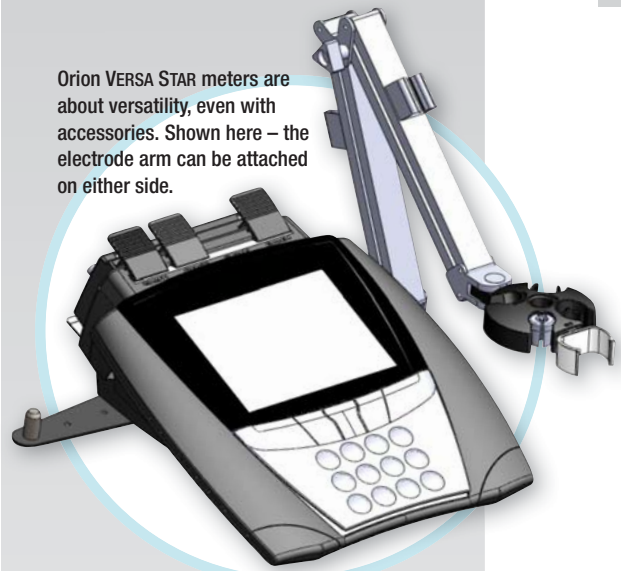
**• Dissolved Oxygen/RDO/Temperature Module:**

- Takes the worry out of DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- Compensates automatically for temperature, salinity with manual input and barometric pressure (automatic or manual)
- Allows for calibration using water-saturated air, air-saturated water, a Winkler titration or zero point
- Calculates BOD/DOUR/SOUR readings when combined with the complimentary data analysis software

**• Module Featuring LogR Technology:**

- Includes all of the features of the pH module with the added benefits of:
  - The most advanced electrode diagnostics
  - No temperature sensor needed to get temperature-compensated pH readings

Orion VERSA STAR meters are about versatility, even with accessories. Shown here – the electrode arm can be attached on either side.



Orion VERSA STAR meters can be configured a variety of ways at any time. This example shows a meter with the pH/LogR module and a pH/ISE module.



No need to turn off your meter to switch modules – meter automatically recognizes module changes.





## Thermo Scientific Orion VERSA STAR 90

pH/ISE/Conductivity/RDO/Dissolved Oxygen Benchtop Meters

Looking for the top-of-the-line, best meter you can find? Looking for something for everything and meeting all those testing needs? Whether it's one sample that needs a variety of testing or a variety of samples needing one test, the Orion VERSA STAR 90 and 91 advanced multiparameter meters are ready for the job. These meters come fully-loaded and ready to take on multiple measurements.

### Highlighted Features Include:

- Display customization to show only the information you need
- Plain language screen prompts, function keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese make it easy for anyone to use this meter
- Non-volatile memory that holds up to 2000 data points with time and date stamp
- Stores up to 10 methods per channel allow for customized procedures to differentiate between tests and/or users
- Two USB and a RS232 port makes for easy data transfer and updating meter software
- Complimentary data analysis software for easy transferring of stored results, real-time viewing and calculation of BOD, DOUR and SOUR results
- Option to control sample mixing directly from the meter without a separate stir plate when using with the Orion Star stirrer probe
- Increase your productivity – two stirrer probe ports allow for simultaneous stirring and control for two separate samples at the same time
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Working with almost every AC power source through the included universal power adapter
- IP54-rated housing handles splashes and cleans up easily
- 3 year meter replacement warranty

### Product Specifications – Orion VERSA STAR Meter

|                                       |                           | CE   TUV   EPA   |
|---------------------------------------|---------------------------|--|
| <b>Maximum Number of Modules</b>      |                           | 4  |
| <b>Methods</b>                        |                           | Up to 10   |
| <b>Datalogging</b>                    | <b>Number of Datalogs</b> | 2000 with time and date stamp                            |
|                                       | <b>Log Function</b>       | Manual, AUTO-READ™, timed interval, single timed reading |
| <b>Communication Ports</b>            |                           | One RS232, two USB ports (one client, one host)          |
| <b>Orion Star Stirrer Probe Ports</b> |                           | 2  |
| <b>Power</b>                          |                           | Universal, AC power adapter, 90-260 VAC, 50-60 Hz        |

### Product Specifications – pH/ISE Module (VSTAR-ISE)

|                       |                               |   | CE   TUV   EPA |
|-----------------------|-------------------------------|---|----------------|
| <b>pH</b>             | <b>Range</b>                  | -2.000 to 20.000  |                |
|                       | <b>Resolution</b>             | 0.1, 0.01, 0.001  |                |
|                       | <b>Relative Accuracy</b>      | ±0.002  |                |
|                       | <b>Calibration Points</b>     | Up to 6   |                |
|                       | <b>Calibration Editing</b>    | Yes   |                |
|                       | <b>Adjustable ISO Point</b>   | Yes   |                |
| <b>mV/Rel mV/ ORP</b> | <b>Range</b>                  | ±2000.0 mV  |                |
|                       | <b>Resolution</b>             | 0.1   |                |
|                       | <b>Relative Accuracy</b>      | ±0.2 mV or ±0.05 % of reading whichever is greater  |                |
|                       | <b>E<sub>n</sub> ORP Mode</b> | Yes   |                |
| <b>ISE</b>            | <b>Range</b>                  | 0 to 19999  |                |
|                       | <b>Resolution</b>             | Up to 4 significant digits  |                |
|                       | <b>Relative Accuracy</b>      | ±0.2 mV or ±0.05 % of reading whichever is greater  |                |
|                       | <b>Units</b>                  | ppm, M, mg/L, %, ppb, none  |                |
|                       | <b>Calibration Points</b>     | Up to 6   |                |
|                       | <b>Calibration Editing</b>    | Yes   |                |
|                       | <b>Adjustable ISO Point</b>   | Yes   |                |
|                       | <b>Calibration Features</b>   | Timed end point, linear point to point, non-linear selectable auto-blank, low concentration range stability     |                |
|                       | <b>Incremental Techniques</b> | Single known addition & subtraction, double known addition & subtraction, single analate addition & subtraction |                |
|                       | <b>Advanced Features</b>      | Displays electrode type, temperature compensation   |                |
| <b>Temperature</b>    | <b>Range</b>                  | -5 to 105 °C, 23 to 221 °F  |                |
|                       | <b>Resolution</b>             | 0.1   |                |
|                       | <b>Relative Accuracy</b>      | ±0.1  |                |
|                       | <b>Offset Calibration</b>     | 1 point   |                |
| <b>Inputs</b>         | <b>pH/ISE</b>                 | BNC, reference pin  |                |
|                       | <b>ATC</b>                    | 8-pin mini-DIN  |                |

### Product Specifications – Conductivity Module (VSTAR-CND)

|                     |                                  |   | CE   TUV   EPA |
|---------------------|----------------------------------|---|----------------|
| <b>Conductivity</b> | <b>Range</b>                     | 0.001 µS to 3000 mS                             |                |
|                     | <b>Resolution</b>                | 0.001 µS minimum; 4 significant figures minimum |                |
|                     | <b>Relative Accuracy</b>         | 0.5 % reading ±1 digit                          |                |
|                     | <b>Reference Temperature</b>     | 5, 10, 15, 20, 25 °C                            |                |
|                     | <b>Temperature Compensation</b>  | Linear (0 to 10.0 %/°C), nLn, nLFu, USP/EP      |                |
|                     | <b>Compatible Cell Constants</b> | 0.001 to 199.9                                  |                |
|                     | <b>Calibration Points</b>        | Up to 6 points                                  |                |
|                     | <b>Calibration Editing</b>       | Yes   |                |





|             |                    |  |
|-------------|--------------------|--|
| Resistivity | Range              | 2 ohm to 100 meg-ohm                         |
|             | Resolution         | 2 ohms-cm                                    |
|             | Relative Accuracy  | 0.5 % reading ±1 digit                       |
| Salinity    | Type               | Practical salinity or natural sea water      |
|             | Range              | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water |
|             | Resolution         | 0.01   |
|             | Relative Accuracy  | ±0.1   |
| TDS         | Range              | 0 to 200 ppt                                 |
|             | Resolution         | 4 significant digits                         |
|             | Relative Accuracy  | ±0.5 % reading ±1 digit                      |
| Temperature | TDS Factor Range   | Linear 0.01 to 10.00                         |
|             | Range              | -5 to 105 °C, 23 to 221 °F                   |
|             | Resolution         | 0.1  |
|             | Relative Accuracy  | ±0.1   |
| Input       | Offset Calibration | 1 point                                      |
|             |                    | 8-pin mini-DIN                               |

**Product Specifications – RDO/DO Module (VSTAR-RD)**

| CE   TUV   EPA    |   |   |
|-------------------|---|---|
| Dissolved Oxygen  | <b>Concentration - Polarographic</b>            |   |
|                   | Range   | 0 to 90 mg/L  |
|                   | Resolution                                      | 0.01, 0.1   |
|                   | Relative Accuracy                               | ±0.2  |
|                   | <b>% Saturation - Polarographic</b>             |   |
|                   | Range   | 0 to 600  |
|                   | Resolution                                      | 0.1, 1  |
|                   | Relative Accuracy                               | ±2 %  |
|                   | <b>Concentration - RDO</b>                      |   |
|                   | Range   | 0 to 50 mg/L  |
|                   | Resolution                                      | 0.01, 0.1   |
|                   | Relative Accuracy                               | ±0.1 mg/L up to 8 mg/L;<br>±0.2 mg/L from 8 to 20 mg/L;<br>10 % of reading, 20 to 50 mg/L |
|                   | <b>% Saturation - RDO</b>                       |   |
|                   | Range   | 0 to 500  |
|                   | Resolution                                      | 0.1, 1  |
| Relative Accuracy | ±2 %  |   |
| Temperature       | <b>Automatic Barometric Pressure Correction</b> | 450.0 to 850.0 mm Hg  |
|                   | <b>Salinity Factor Correction</b>               | Automatic when used with conductivity module and probe or manual; 0 to 45 ppt             |
|                   | <b>Calibration Features</b>                     | Water saturated air, air saturated water, manual (Winkler) and zero point                 |
|                   | <b>Probe Type</b>                               | Polarographic or RDO  |
|                   | Range   | 0 to 50 °C, 32 to 122 °F  |
|                   | Resolution                                      | 0.1   |
|                   | Relative Accuracy                               | ±0.1  |
| Input             | Offset Calibration                              | 1 point   |
|                   |   | 9-pin mini-DIN  |

**Meter Ordering Information**

| Cat. No. | Description  |
|----------|--|
| VSTAR90  | <b>Orion VERSA STAR pH/ISE/Conductivity/RDO/Dissolved Oxygen Benchtop Multiparameter Meter Set</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR pH/ISE/temperature module<br>- Orion VERSA STAR conductivity/temperature module<br>- Orion VERSA STAR dissolved oxygen/temperature module<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| VSTAR91  | <b>Orion VERSA STAR pH/ISE/Conductivity/RDO/Dissolved Oxygen Ultimate Benchtop Multiparameter Meter Set</b><br>- Orion VERSA STAR meter<br>- Two Orion VERSA STAR pH/ISE/temperature modules<br>- Orion VERSA STAR conductivity/temperature module<br>- Orion VERSA STAR dissolved oxygen/temperature module<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| VSTAR92  | <b>Orion VERSA STAR pH/ISE/Conductivity/RDO/Dissolved Oxygen Benchtop Multiparameter Meter Kit</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR pH/ISE/temperature module<br>- Orion VERSA STAR conductivity/temperature module<br>- Orion VERSA STAR dissolved oxygen/temperature module<br>- 8157BNUMD Orion ROSS Ultra Triode pH/ATC probe<br>- 013005MD Orion DuraProbe conductivity cell, K=0.475<br>- 083005MD Orion polarographic DO probe<br>- 096019 Orion Star stirrer probe<br>- 080017 calibration sleeve for DO probe<br>- 080513 DO probe maintenance kit<br>- BOD adapter, funnel and stirrer<br>- 810199 ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- 011007 conductivity standard, 1413 µS, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter               |
| VSTAR93  | <b>Orion VERSA STAR pH/ISE/Conductivity/RDO/Dissolved Oxygen Ultimate Benchtop Multiparameter Meter Kit</b><br>- Orion VERSA STAR meter<br>- Two Orion VERSA STAR pH/ISE/temperature modules<br>- Orion VERSA STAR conductivity/temperature module<br>- Orion VERSA STAR dissolved oxygen/temperature module<br>- 8157BNUMD Orion ROSS Ultra Triode pH/ATC probe<br>- 013005MD Orion DuraProbe conductivity cell, K=0.475<br>- 083005MD Orion polarographic DO probe<br>- 096019 Orion Star stirrer probe<br>- 080017 calibration sleeve for DO probe<br>- 080513 DO probe maintenance kit<br>- BOD adapter, funnel and stirrer<br>- 810199 ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- 011007 conductivity standard, 1413 µS, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter |



- pH
- ISE
- ORP
- Cond
- RDO
- DO
- Temp



## Thermo Scientific Orion VERSA STAR 40

### pH/ISE Benchtop Meters

Measuring pH/ISE has never looked so good or been so easy. The large color display is easy on to read and easy on the eyes. Prompts make accuracy and repeatability easy for even the most complicated testing. If you need to add more channels for more or obtain more parameters from the same, simply remove the protective individual channel cover and add the new module.

#### Features and Benefits

- Versatility is the name of the game
  - Change out modules to create the meter you need at any time
  - Customize the display to show only the information you need
- Up to 6 point pH calibration with automatic recognition for USA/NIST and DIN buffers and electrode identification
- This meter features advanced ISE capabilities to work with all ISE testing applications, even the most complex
  - Up to 6 point ISE calibration with timed end point and point-to-point or linear regression slope
  - Non-linear selectable auto-blank and low-concentration range stability
  - Incremental techniques for known or analyte addition and subtraction
  - Adjustable isopoint for temperature-compensated ISE results
- Fix errors without a complete recalibration with the calibration editing function
- Anyone can use this meter with its plain language screen prompts, function keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals or just once with single-shot mode
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods per channel allow for customized procedures to differentiate between tests and/or users
- Two USB and a RS232 port makes for easy data transfer and updating meter software
- Includes data analysis software for easy transferring of stored results or real-time viewing
- Increase your productivity – two Orion Star stirrer probe ports allow for simultaneous stirring and control for two separate samples at the same time
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source through the included universal power adapter
- IP54-rated housing handles splashes and cleans up easily
- 3 year meter replacement warranty

#### Product Specifications – Orion VERSA STAR Meter

|                                       |                           | CE   TUV   EPA   |
|---------------------------------------|---------------------------|--|
| <b>Maximum Number of Modules</b>      |                           | 4  |
| <b>Methods</b>                        |                           | Up to 10   |
| <b>Datalogging</b>                    | <b>Number of Datalogs</b> | 2000 with time and date stamp                            |
|                                       | <b>Log Function</b>       | Manual, AUTO-READ™, timed interval, single timed reading |
| <b>Communication Ports</b>            |                           | One RS232, two USB ports (one client, one host)          |
| <b>Orion Star Stirrer Probe Ports</b> |                           | 2  |
| <b>Power</b>                          |                           | Universal, AC power adapter, 90-260 VAC, 50-60 Hz        |

#### Product Specifications – pH/ISE Module (VSTAR-ISE)

|                       |                               |  | CE   TUV   EPA  |
|-----------------------|-------------------------------|--|---|
| <b>pH</b>             | <b>Range</b>                  |  | -2.000 to 20.000  |
|                       | <b>Resolution</b>             |  | 0.1, 0.01, 0.001  |
|                       | <b>Relative Accuracy</b>      |  | ±0.002  |
|                       | <b>Calibration Points</b>     |  | Up to 6   |
|                       | <b>Calibration Editing</b>    |  | Yes   |
|                       | <b>Adjustable ISO Point</b>   |  | Yes   |
| <b>mV/Rel mV/ ORP</b> | <b>Range</b>                  |  | ±2000.0 mV  |
|                       | <b>Resolution</b>             |  | 0.1   |
|                       | <b>Relative Accuracy</b>      |  | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                       | <b>E<sub>n</sub> ORP Mode</b> |  | Yes   |
| <b>ISE</b>            | <b>Range</b>                  |  | 0 to 19999  |
|                       | <b>Resolution</b>             |  | Up to 4 significant digits  |
|                       | <b>Relative Accuracy</b>      |  | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                       | <b>Units</b>                  |  | ppm, M, mg/L, %, ppb, none  |
|                       | <b>Calibration Points</b>     |  | Up to 6   |
|                       | <b>Calibration Editing</b>    |  | Yes   |
|                       | <b>Adjustable ISO Point</b>   |  | Yes   |
|                       | <b>Calibration Features</b>   |  | Timed end point, linear point to point, non-linear selectable auto-blank, low concentration range stability     |
|                       | <b>Incremental Techniques</b> |  | Single known addition & subtraction, double known addition & subtraction, single analyte addition & subtraction |
|                       | <b>Advanced Features</b>      |  | Displays electrode type, temperature compensation   |
| <b>Temperature</b>    | <b>Range</b>                  |  | -5 to 105 °C, 23 to 221 °F  |
|                       | <b>Resolution</b>             |  | 0.1   |
|                       | <b>Relative Accuracy</b>      |  | ±0.1  |
|                       | <b>Offset Calibration</b>     |  | 1 point   |
| <b>Inputs</b>         | <b>pH/ISE</b>                 |  | BNC, reference pin  |
|                       | <b>ATC</b>                    |  | 8-pin mini-DIN  |



**Meter Ordering Information**

| Cat. No.         | Description  |
|------------------|--|
| <b>VSTAR40A</b>  | <b>Orion VERSA STAR pH/ISE Benchtop Meter Set</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR pH/ISE/temperature module<br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| <b>VSTAR40A2</b> | <b>Orion VERSA STAR pH/ISE Benchtop Meter Kit</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR pH/ISE/temperature module<br>- 8102BNUWP Orion ROSS Ultra pH electrode<br>- 096019 Orion Star stirrer probe<br>- 927007MD ATC probe, stainless steel<br>- ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- Electrode arm with redesigned holder<br>- Universal power adapter                             |
| <b>VSTAR40B</b>  | <b>Orion VERSA STAR Benchtop Meter with Two pH/ISE Modules Set</b><br>- Orion VERSA STAR meter<br>- Two Orion VERSA STAR pH/ISE/temperature modules<br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| <b>VSTAR40B2</b> | <b>Orion VERSA STAR Benchtop Meter with Two pH/ISE Modules Kit</b><br>- Orion VERSA STAR meter<br>- Two Orion VERSA STAR pH/ISE/temperature modules<br>- 8102BNUWP Orion ROSS Ultra pH electrode<br>- 096019 Orion Star stirrer probe<br>- 927007MD ATC probe, stainless steel<br>- ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- Two electrode arms with redesigned holders<br>- Universal power adapter |

**Accessories**

| Cat. No.          | Description   |
|-------------------|---|
| <b>VSTAR-PH</b>   | Orion VERSA STAR pH/temperature module                                    |
| <b>VSTAR-ISE</b>  | Orion VERSA STAR pH/ISE/temperature module                                |
| <b>VSTAR-CND</b>  | Orion VERSA STAR conductivity/temperature module                          |
| <b>VSTAR-RD</b>   | Orion VERSA STAR RDO/DO/temperature module                                |
| <b>VSTAR-LR</b>   | Orion VERSA STAR pH/temperature with LogR technology module               |
| <b>STARA-BEA</b>  | Benchtop electrode arm for Orion Star A-series meters                     |
| <b>STARA-HB</b>   | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| <b>STARA-PWR</b>  | Replacement universal power adapter for Orion VERSA STAR meters           |
| <b>096019</b>     | Orion Star stirrer probe  |
| <b>8102BNUWP</b>  | Orion ROSS Ultra pH electrode, refillable, glass body                     |
| <b>8172BNWP</b>   | Orion ROSS Sure-Flow pH electrode, glass body                             |
| <b>8156BNUWP</b>  | Orion ROSS Ultra refillable pH electrode, epoxy body                      |
| <b>8157BNUMD</b>  | Orion ROSS Triode pH/ATC electrode, refillable, epoxy body                |
| <b>8302BNUMD</b>  | Orion ROSS Triode pH/ATC electrode, refillable, glass body                |
| <b>927007MD</b>   | Orion ATC probe, stainless steel body                                     |
| <b>927005MD</b>   | Orion ATC probe, epoxy body   |
| <b>013005MD</b>   | Orion DuraProbe conductivity cell, 4-cell, K=0.475                        |
| <b>013016MD</b>   | Orion conductivity cell, flow through, K=0.1                              |
| <b>083005MD</b>   | Orion dissolved oxygen probe, polarographic                               |
| <b>086030MD</b>   | Orion auto-stir DO/BOD probe, polarographic                               |
| <b>087010MD</b>   | Orion RDO optical DO probe, 3 m cable                                     |
| <b>810199</b>     | Orion ROSS all-in-one pH buffer kit                                       |
| <b>910104</b>     | Orion pH 4.01 buffer, 475 mL  |
| <b>910107</b>     | Orion pH 7.00 buffer, 475 mL  |
| <b>910110</b>     | Orion pH 10.01 buffer, 475 mL   |
| <b>011008</b>     | Orion conductivity standard, 100 µS/cm, 5 x 60 mL bottles                 |
| <b>011007</b>     | Orion conductivity standard, 1413 µS/cm, 5 x 60 mL bottles                |
| <b>011006</b>     | Orion conductivity standard, 12.9 mS/cm, 5 x 60 mL bottles                |
| <b>1010001</b>    | Orion conductivity calibration resistor kit                               |
| <b>9512HPBNWP</b> | Orion high-performance ammonia ISE  |
| <b>9512BNWP</b>   | Orion standard ammonia ISE  |
| <b>951007</b>     | Ammonia standard, 1000 ppm, 475 mL  |
| <b>951210</b>     | Low-level ammonia ISA   |
| <b>951211</b>     | Ammonia ISA, 475 mL   |
| <b>951209</b>     | Fill solution for Orion high-performance ammonia ISE, 60 mL               |
| <b>951202</b>     | Fill solution for standard ammonia ISE, 60 mL                             |
| <b>951213</b>     | Ammonia ISE storage solution  |
| <b>9609BNWP</b>   | Orion fluoride combination ISE  |
| <b>040906</b>     | Fluoride standard, 1 ppm with TISAB II, 475 mL                            |
| <b>040907</b>     | Fluoride standard, 2 ppm with TISAB II, 475 mL                            |
| <b>040908</b>     | Fluoride standard, 10 ppm with TISAB II, 475 mL                           |
| <b>940909</b>     | TISAB II, 1 gallon  |
| <b>8611BNWP</b>   | Orion ROSS sodium combination ISE with sodium standards                   |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion DUAL STAR™

Dual Channel pH/ISE Benchtop Meter

Display shows results, electrode status, ATC temperature and channel settings. If a method is selected, the number shows as well

Power key turns on/off the meter and adjusts backlighting

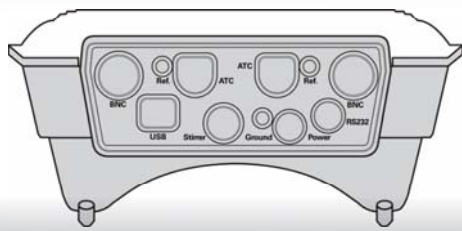
Shortcut keys for direct access to commonly used functions

Channel key toggles display to show both channels simultaneously or just one

Single channel display also shows electrode serial number, sample ID, date and time

Function keys update according to the menu for easy selection

Numeric keypad for easy data entry in submenus



### Features and Benefits

- Dual channel with simultaneously displayed measurements
- Low concentration range reading stability
- Known addition and subtraction incremental methods
- 5 language choices: English, Spanish, French, German and Italian
- Meter prompts and shortcut keys
- Thermo Scientific Orion EZ Startup™ for quick and easy meter set-up
- Thermo Scientific Orion SMART STABILITY™ and SMART AVERAGING™ for accurate and fast results
- E<sub>H</sub> ORP calibration capability
- 10 methods stored per channel – retains calibrations among multiple electrodes
- 1000 point datalogging with time and date stamping
- Calibration, high point and low point alarms
- Calibration graph with slope data for on-screen viewing
- Star stirrer probe controlled directly from the meter
- Autosampler compatibility
- 3 year meter replacement warranty



### Product Specifications

| CE   TUV   EPA        |   |  |
|-----------------------|---|--|
| pH                    | <b>Range</b>                                | -2.000 to 19.999   |
|                       | <b>Resolution</b>                           | 0.1, 0.01, 0.001   |
|                       | <b>Relative Accuracy</b>                    | ±0.002   |
|                       | <b>Calibration Points</b>                   | 1 to 6   |
|                       | <b>Auto-Buffer Recognition</b>              | USA/NIST and EURO/DIN  |
| ISE                   | <b>Range</b>                                | 0 to 19999   |
|                       | <b>Resolution</b>                           | 1, 2 or 3 significant digits   |
|                       | <b>Relative Accuracy</b>                    | ±0.2 mV or 0.05 %, whichever is greater  |
|                       | <b>Units</b>                                | ppm, ppb, M, % or unitless   |
|                       | <b>Technique Options</b>                    | Single known addition and subtraction<br>Double known addition and subtraction |
|                       | <b>Calibration Points</b>                   | 2 to 6   |
|                       | <b>Calibration Options</b>                  | Linear, point to point,<br>non-linear selectable auto-bank                     |
| mV/<br>Rel mV/<br>ORP | <b>Range</b>                                | ±1999.9  |
|                       | <b>Resolution</b>                           | 0.1  |
|                       | <b>Relative Accuracy</b>                    | ±0.2 or 0.05 %, whichever is greater   |
|                       | <b>E<sub>n</sub> Calibration Capability</b> | Yes  |
| Temperature           | <b>Range</b>                                | -5 to 105 °C   |
|                       | <b>Resolution</b>                           | 0.1  |
|                       | <b>Relative Accuracy</b>                    | ±0.1 °C  |

### Features

|                            |  |
|----------------------------|--|
| <b>Backlight</b>           | 5 adjustable levels  |
| <b>Method Storage</b>      | 20 (10 per channel with calibration data)                    |
| <b>Password Protection</b> | Yes  |
| <b>Datalog Points</b>      | 1000 with time/date stamp                                    |
| <b>Data Transfer</b>       | RS232, USB   |
| <b>IP Rating</b>           | IP54   |
| <b>Power</b>               | Universal AC adapter (110V/220V/240V)<br>included with meter |
| <b>Warranty</b>            | 36 months replacement  |

### Meter Ordering Information

| Cat. No.       | Description  |
|----------------|--|
| <b>2115000</b> | - Orion DUAL STAR pH/ISE meter<br>- Stainless steel ATC probe (927007MD)<br>- Swing arm electrode stand (090043)<br>- RS232 cable (1010053)<br>- Universal power adapter<br>- User guide   |
| <b>2115101</b> | - Orion DUAL STAR pH/ISE meter<br>- 8102BNUWP ROSS Ultra <sup>®</sup> pH electrode<br>- Stainless steel ATC probe (927007MD)<br>- RS232 cable (1010053)<br>- Swing arm electrode stand (090043)<br>- Universal power adapter<br>- User guide   |
| <b>2115102</b> | - Orion DUAL STAR pH/ISE meter<br>- 8157BNUMD ROSS Ultra pH/ATC Triode <sup>™</sup><br>refillable electrode<br>- RS232 cable (1010053)<br>- Universal power adapter<br>- User guide  |
| <b>2115001</b> | - Orion DUAL STAR pH/ISE meter<br>- 8102BNUWP ROSS Ultra pH electrode<br>- Stainless steel ATC probe (927007MD)<br>- RS232 cable (1010053)<br>- Swing arm electrode stand (090043)<br>- Pint of pH 4.01 buffer (910104)<br>- Pint of pH 7.00 buffer (910107)<br>- Pint of pH 10.01 buffer (910110)<br>- Pint of ROSS <sup>®</sup> electrode storage solution (810001)<br>- Universal power adapter<br>- User guide |

### Accessories

| Cat. No.      | Description                                       |
|---------------|---|
| <b>096019</b> | Thermo Scientific Orion stirrer probe with paddle |
| <b>910104</b> | pH 4.01 buffer, 475 mL                            |
| <b>910107</b> | pH 7.00 buffer, 475 mL                            |
| <b>910110</b> | pH 10.01 buffer, 475 mL                           |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A214 pH/ISE Benchtop Meter

The Thermo Scientific Orion Star A214 pH/ISE Benchtop Meter is the ideal choice for dedicated ISE analysis. Whether you use ISE infrequently or have multiple samples every day, get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows pH/mV/RmV/ISE results and temperature along with electrode status, time, date, sample ID, user ID and calibration points. For advanced users, features such as stability and averaging choices provide additional options.

Keep turning the pages for more great finds.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Up to 5 point ISE calibration with advanced features such as timed end point, linear point-to-point, non-linear selectable auto-blank and low-concentration range stability
- Fix errors without a complete recalibration with the calibration editing function
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Mix samples without a stir plate with direct control of the Orion Star stirrer probe (096019, sold separately)
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- IP54-rated housing handles splashes and is wall-mountable if table space is a problem
- 3 year meter replacement warranty



### Product Specifications

| CE   TUV   FCC    |                         |   |
|-------------------|-------------------------|---|
| pH                | Range                   | -2.000 to 20.000  |
|                   | Resolution              | 0.1, 0.01, 0.001  |
|                   | Relative Accuracy       | ±0.002  |
|                   | Calibration Points      | Up to 5   |
|                   | Calibration Editing     | Yes   |
| mV/Rel mV/<br>ORP | Range                   | ±2000.0 mV  |
|                   | Resolution              | 0.1   |
|                   | Relative Accuracy       | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                   | E <sub>s</sub> ORP Mode | Yes   |
| ISE               | Range                   | 0 to 19999  |
|                   | Resolution              | Up to 3 significant digits  |
|                   | Relative Accuracy       | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                   | Units                   | ppm, M, mg/L, %, ppb, none  |
|                   | Calibration Points      | Up to 5   |
|                   | Calibration Editing     | Yes   |
|                   | Calibration Features    | Timed end point, linear point to point, non-linear selectable auto-blank, low concentration range stability |
| Temperature       | Range                   | -5 to 105 °C, 23 to 221 °F  |
|                   | Resolution              | 0.1   |
|                   | Relative Accuracy       | ±0.1  |
|                   | Offset Calibration      | 1 point   |
| Datalogging       | Number of Datalogs      | 2000 with time and date stamp   |
|                   | Log Function            | Manual, ready (include AUTO-READ™), timed   |
| Inputs            | pH Electrode            | BNC, reference pin  |
|                   | ATC Probe               | 8-pin mini-DIN  |
| Output            |                         | RS232, USB  |
| Power             | AC Adapter              | Included – universal, 100-240 VAC   |
|                   | Battery Power           | Optional – 4 AAs  |
|                   | Battery Life            | 800 hrs   |

### Meter Ordering Information

| Cat. No.  | Description   |
|-----------|---|
| STARA2140 | <b>Orion Star A214 pH/ISE Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| STARA2145 | <b>Orion Star A214 pH/ISE Benchtop Meter Kit</b><br>- 8102BNUWP Orion ROSS Ultra pH electrode<br>- 927007MD ATC probe, stainless steel<br>- 096019 Orion Star stirrer probe<br>- 810199 ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| STARA2146 | <b>Orion Star A214 pH/ISE Benchtop Meter Kit for Ammonia</b><br>- 8102BNUWP Orion ROSS Ultra pH electrode<br>- 9512HPBNWP Orion high-performance Ammonia ISE<br>- 927007MD ATC probe, stainless steel<br>- 096019 Orion Star stirrer probe<br>- 951007 Orion Ammonia 1000 ppm standard, 475 mL<br>- 951210 Orion Low-level Ammonia ISA<br>- 951213 Ammonia ISE storage solution<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| STARA2147 | <b>Orion Star A214 pH/ISE Benchtop Meter Kit for Fluoride</b><br>- 8102BNUWP Orion ROSS Ultra pH electrode<br>- 9609BNWP Orion fluoride ISE<br>- 927007MD ATC probe, stainless steel<br>- 096019 Orion Star stirrer probe<br>- 040906 Orion fluoride standard, 1 ppm with TISABII, 475 mL<br>- 040907 Orion fluoride standard, 2 ppm with TISABII, 475 mL<br>- 040908 Orion fluoride standard, 10 ppm with TISAB II, 475 mL<br>- 940909 Orion TISABII solution, 1 gallon<br>- Electrode arm with redesigned holder<br>- Universal power adapter |
| STARA2148 | <b>Orion Star A214 pH/ISE Benchtop Meter Kit for Sodium</b><br>- 8102BNUWP Orion ROSS Ultra pH electrode<br>- 8611BNWP Orion ROSS sodium ISE with sodium standards<br>- 927007MD ATC probe, stainless steel<br>- 096019 Orion Star stirrer probe<br>- Electrode arm with redesigned holder<br>- Universal power adapter   |

### Accessories

| Cat. No. | Description                                     |
|----------|---|
| 810199   | Orion ROSS All-in-One pH buffer kit             |
| 951007   | Ammonia standard, 1000 ppm, 475 mL              |
| 951210   | Low-level ammonia ISA                           |
| 951211   | Ammonia ISA, 475 mL                             |
| 040906   | Fluoride standard, 1 ppm with TISAB II, 475 mL  |
| 040907   | Fluoride standard, 2 ppm with TISAB II, 475 mL  |
| 040908   | Fluoride standard, 10 ppm with TISAB II, 475 mL |
| 940909   | TISAB II, 1 gallon                              |

pH

ISE

ORP

Cond

RDO

DO

Temp



## Thermo Scientific Orion VERSA STAR 50

### pH/Conductivity Benchtop Meters

Ideal for checking solution conductivity and follow-up pH testing. The large color display is easy to read and easy on the eyes. Prompts make accuracy and repeatability easy for even the most complicated testing. If you need to add more channels for more or obtain more parameters from the same, simply remove the protective individual channel cover and add the new module.

#### Features and Benefits

- Versatility is the name of the game
  - Customize the display to show only the information you need
  - Change out modules to create the meter you need at any time
- Up to 6 point pH calibration with automatic recognition for USA/NIST and DIN buffers and electrode identification
- Fix errors without a complete recalibration with the calibration editing function
- Conductivity, TDS, salinity or resistivity capabilities
  - Selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C
  - Linear, non-linear, nLFu or USP/EP curve options to get the most accurate conductivity result for your sample and temperature
  - Choice of practical salinity or natural sea water curves for salinity readings
  - Linear or ISO/EN 27888 curves for TDS
- Anyone can use this meter with its plain language screen prompts, function keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals or just once with the single-shot mode
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods per channel allow for customized procedures to differentiate between tests and/or users
- Two USB and a RS232 port makes for easy data transfer and updating meter software
- Includes data analysis software for easy transferring of stored results or real-time viewing
- Control sample mixing directly from the meter without a separate stir plate when using with the Orion Star stirrer probe (cat. no. 096019, sold separately)
- Increase your productivity – with two stirrer probe ports, add stirrers and modules to analyze two separate samples at the same time
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source through the included universal power adapter
- IP54-rated housing handles splashes and cleans up easily
- 3 year meter replacement warranty

#### Product Specifications – Orion VERSA STAR Meter

|                                       |                           | CE   TUV   EPA   |
|---------------------------------------|---------------------------|--|
| <b>Maximum Number of Modules</b>      |                           | 4  |
| <b>Methods</b>                        |                           | Up to 10   |
| <b>Datalogging</b>                    | <b>Number of Datalogs</b> | 2000 with time and date stamp                            |
|                                       | <b>Log Function</b>       | Manual, AUTO-READ™, timed interval, single timed reading |
| <b>Communication Ports</b>            |                           | One RS232, two USB ports (one client, one host)          |
| <b>Orion Star Stirrer Probe Ports</b> |                           | 2  |
| <b>Power</b>                          |                           | Universal, AC power adapter, 90-260 VAC, 50-60 Hz        |

#### Product Specifications – pH Module (VSTAR-PH)

|                       |                               | CE   TUV   EPA                                     |
|-----------------------|-------------------------------|--|
| <b>pH</b>             | <b>Range</b>                  | -2.000 to 20.000                                   |
|                       | <b>Resolution</b>             | 0.1, 0.01, 0.001                                   |
|                       | <b>Relative Accuracy</b>      | ±0.002   |
|                       | <b>Calibration Points</b>     | Up to 6  |
|                       | <b>Calibration Editing</b>    | Yes  |
|                       | <b>Adjustable ISO Point</b>   | Yes  |
| <b>mV/Rel mV/ ORP</b> | <b>Range</b>                  | ±2000.0 mV   |
|                       | <b>Resolution</b>             | 0.1  |
|                       | <b>Relative Accuracy</b>      | ±0.2 mV or ±0.05 % of reading whichever is greater |
|                       | <b>E<sub>n</sub> ORP Mode</b> | Yes  |
| <b>Temperature</b>    | <b>Range</b>                  | -5 to 105 °C, 23 to 221 °F                         |
|                       | <b>Resolution</b>             | 0.1  |
|                       | <b>Relative Accuracy</b>      | ±0.1   |
|                       | <b>Offset Calibration</b>     | 1 point  |
| <b>Inputs</b>         | <b>pH/ISE</b>                 | BNC, reference pin                                 |
|                       | <b>ATC</b>                    | 8-pin mini-DIN                                     |





**Product Specifications – Conductivity Module (VSTAR-CND) Meter Ordering Information**

| CE   TUV   EPA      |                                  |  |
|---------------------|----------------------------------|--|
| <b>Conductivity</b> | <b>Range</b>                     | 0.001 µS to 3000 mS                                |
|                     | <b>Resolution</b>                | 0.001 µS minimum;<br>4 significant figures minimum |
|                     | <b>Relative Accuracy</b>         | 0.5 % reading ±1 digit                             |
|                     | <b>Reference Temperature</b>     | 5, 10, 15, 20, 25 °C                               |
|                     | <b>Temperature Compensation</b>  | Linear (0 to 10.0 %/°C), nLn, nLFu, USP/EP         |
|                     | <b>Compatible Cell Constants</b> | 0.001 to 199.9                                     |
|                     | <b>Calibration Points</b>        | Up to 6 points                                     |
|                     | <b>Calibration Editing</b>       | Yes  |
| <b>Resistivity</b>  | <b>Range</b>                     | 2 ohm to 100 meg-ohm                               |
|                     | <b>Resolution</b>                | 2 ohms-cm  |
|                     | <b>Relative Accuracy</b>         | 0.5 % reading ±1 digit                             |
| <b>Salinity</b>     | <b>Type</b>                      | Practical salinity or natural sea water            |
|                     | <b>Range</b>                     | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water       |
|                     | <b>Resolution</b>                | 0.01   |
|                     | <b>Relative Accuracy</b>         | ±0.1   |
| <b>TDS</b>          | <b>Range</b>                     | 0 to 200 ppt                                       |
|                     | <b>Resolution</b>                | 4 significant digits                               |
|                     | <b>Relative Accuracy</b>         | ±0.5 % reading ±1 digit                            |
|                     | <b>TDS Factor Range</b>          | Linear 0.01 to 10.00                               |
| <b>Temperature</b>  | <b>Range</b>                     | -5 to 105 °C, 23 to 221 °F                         |
|                     | <b>Resolution</b>                | 0.1  |
|                     | <b>Relative Accuracy</b>         | ±0.1   |
|                     | <b>Offset Calibration</b>        | 1 point  |
| <b>Inputs</b>       | 8-pin mini-DIN                   |  |

| Cat. No.       | Description   |
|----------------|---|
| <b>VSTAR50</b> | <b>Orion VERSA STAR pH/Conductivity Benchtop Meter Set</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR pH/temperature module<br>- Orion VERSA STAR conductivity/temperature module<br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
|                | <b>Orion VERSA STAR pH/Conductivity Benchtop Meter Kit</b><br>- Orion VERSA STAR meter with pH/temperature module<br>- Orion VERSA STAR conductivity/temperature module<br>- 8157BNUMD Orion ROSS Ultra Triode pH/ATC probe<br>- 013005MD Orion DuraProbe conductivity cell, K=0.475<br>- 810199 ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- 011007 conductivity standard, 1413 µS, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

**Accessories**

| Cat. No.         | Description   |
|------------------|---|
| <b>VSTAR-PH</b>  | Orion VERSA STAR pH/temperature module                                    |
| <b>VSTAR-ISE</b> | Orion VERSA STAR pH/ISE/temperature module                                |
| <b>VSTAR-CND</b> | Orion VERSA STAR conductivity/temperature module                          |
| <b>VSTAR-RD</b>  | Orion VERSA STAR RDO/DO/temperature module                                |
| <b>VSTAR-LR</b>  | Orion VERSA STAR pH/temperature with LogR technology module               |
| <b>STARA-BEA</b> | Benchtop electrode arm for Orion Star A-series meters                     |
| <b>STARA-HB</b>  | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| <b>STARA-PWR</b> | Replacement universal power adapter for Orion VERSA STAR meters           |
| <b>096019</b>    | Orion Star stirrer probe  |
| <b>8102BNUWP</b> | Orion ROSS Ultra pH electrode, refillable, glass body                     |
| <b>8172BNWP</b>  | Orion ROSS Sure-Flow pH electrode, glass body                             |
| <b>8156BNUWP</b> | Orion ROSS Ultra refillable pH electrode, epoxy body                      |
| <b>8157BNUMD</b> | Orion ROSS Triode pH/ATC electrode, refillable, epoxy body                |
| <b>8302BNUMD</b> | Orion ROSS Triode pH/ATC electrode, refillable, glass body                |
| <b>927007MD</b>  | Orion ATC probe, stainless steel body                                     |
| <b>927005MD</b>  | Orion ATC probe, epoxy body   |
| <b>013005MD</b>  | Orion DuraProbe conductivity cell, 4-cell, K=0.475                        |
| <b>013016MD</b>  | Orion conductivity cell, flow through, K=0.1                              |
| <b>810199</b>    | Orion ROSS all-in-one pH buffer kit                                       |
| <b>910104</b>    | Orion pH 4.01 buffer, 475 mL  |
| <b>910107</b>    | Orion pH 7.00 buffer, 475 mL  |
| <b>910110</b>    | Orion pH 10.01 buffer, 475 mL   |
| <b>011008</b>    | Orion conductivity standard, 100 µS/cm, 5 x 60 mL bottles                 |
| <b>011007</b>    | Orion conductivity standard, 1413 µS/cm, 5 x 60 mL bottles                |
| <b>011006</b>    | Orion conductivity standard, 12.9 mS/cm, 5 x 60 mL bottles                |
| <b>1010001</b>   | Orion conductivity calibration resistor kit                               |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A215 pH/Conductivity Benchtop Meter

The Thermo Scientific Orion Star A215 pH/Conductivity Benchtop Meter is the ideal choice for any pharmacology lab. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows individual pH/mV/RmV or conductivity/TDS/salinity/resistivity results with temperature, or all results at once. Additional helpful information includes electrode status, time, date, sample ID, user ID and calibration. For advanced users, features such as stability and averaging choices provide additional options.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers and calibration editing to fix errors without a complete recalibration
- Selectable cell constant allows for use with 2- or 4-cell conductivity cells
- For accurate conductivity results, selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C with linear, non-linear, nLFu or USP/EP curve options
- Choice of practical salinity or natural sea water curves for salinity readings
- Linear or ISO/EN 27888 curves for TDS
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Mix samples without a stir plate with direct control of the Orion Star stirrer probe (096019, sold separately)
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- IP54-rated housing handles splashes and is wall-mountable if table space is a problem
- 3 year meter replacement warranty



## Product Specifications

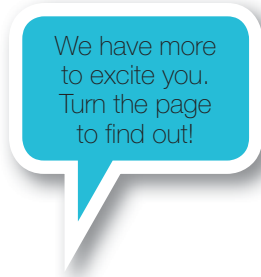
| CE   TUV   FCC    |  |  |
|-------------------|--|--|
| pH                | Range  | -2.000 to 20.000                                   |
|                   | Resolution                                       | 0.1, 0.01, 0.001                                   |
|                   | Relative Accuracy                                | ±0.002   |
|                   | Calibration Points                               | Up to 5  |
|                   | Calibration Editing                              | Yes  |
| mV/Rel mV/<br>ORP | Range  | ±2000.0 mV   |
|                   | Resolution                                       | 0.1  |
|                   | Relative Accuracy                                | ±0.2 mV or ±0.05 % of reading whichever is greater |
|                   | E <sub>r</sub> ORP Mode                          | Yes  |
| Conductivity      | Range  | 0.001 µS to 3000 mS                                |
|                   | Resolution                                       | 0.001 µS minimum;<br>4 significant figures minimum |
|                   | Relative Accuracy                                | 0.5 % reading ±1 digit                             |
|                   | Reference Temperature                            | 5, 10, 15, 20, 25 °C (default)                     |
|                   | Temperature Compensation                         | Linear (0 to 10.0 %/°C),<br>nLn, nLFu, USP/EP      |
|                   | Compatible Cell Constants                        | 0.001 to 199.9                                     |
|                   | Calibration Points                               | Up to 5 points                                     |
|                   | Calibration Editing                              | Yes  |
| Resistivity       | Range  | 2 ohm to 100 meg-ohm                               |
|                   | Resolution                                       | 2 ohms-cm  |
|                   | Relative Accuracy                                | 0.5 % reading ±1 digit                             |
| Salinity          | Type   | Practical salinity or natural sea water            |
|                   | Range  | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water       |
|                   | Resolution                                       | 0.01   |
|                   | Relative Accuracy                                | ±0.1   |
| TDS               | Range  | 1 to 200 ppt                                       |
|                   | Resolution                                       | 4 significant digits                               |
|                   | Relative Accuracy                                | 0.5 % reading ±1 digit                             |
|                   | TDS Factor Range                                 | Linear 0.01 to 10.00, default 0.49                 |
| Temperature       | Range  | -5 to 105 °C, 23 to 221 °F                         |
|                   | Resolution                                       | 0.1  |
|                   | Relative Accuracy                                | ±0.1   |
|                   | Offset Calibration                               | 1 point  |
| Datalogging       | Number of Datalogs                               | 2000 with time and date stamp                      |
|                   | Log Function                                     | Manual, ready (include AUTO-READ™), timed          |
| Inputs            | pH Electrode                                     | BNC, reference pin                                 |
|                   | Conductivity with Temperature Probe or ATC Probe | 8-pin mini-DIN                                     |
| Output            |  | RS232, USB   |
| Power             | AC Adapter                                       | Included – universal, 100-240 VAC                  |
|                   | Battery Power                                    | Optional – 4 AAs                                   |
|                   | Battery Life                                     | 800 hrs  |

## Meter Ordering Information

| Cat. No.  | Description   |
|-----------|---|
| STARA2150 | <b>Orion Star A215 pH/Conductivity Benchtop Multiparameter Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| STARA2155 | <b>Orion Star A215 pH/Conductivity Benchtop Multiparameter Meter Kit</b><br>- 8157BNUMD Orion ROSS Ultra Triode pH/ATC electrode<br>- 013005MD Orion DuraProbe conductivity cell<br>- ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- 011007 Orion 1413 µS conductivity standard, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

## Accessories

| Cat. No.  | Description   |
|-----------|---|
| 096019    | Orion Star stirrer probe  |
| STARA-BEA | Benchtop electrode arm for Orion Star A-series meters                     |
| STARA-HB  | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| 8302BNUMD | Orion ROSS Triode 3-in-1 pH/ATC probe, refillable, glass body             |
| 8102BNUWP | Orion ROSS Ultra refillable pH electrode, glass body                      |
| 927007MD  | Orion ATC probe, stainless steel  |
| 810199    | Orion ROSS All-in-One pH buffer kit                                       |
| 910104    | Orion pH 4.01 buffer, 475 mL  |
| 910107    | Orion pH 7.00 buffer, 475 mL  |
| 910110    | Orion pH 10.01 buffer, 475 mL   |
| 013005MD  | Orion DuraProbe conductivity cell, 4-cell, K=0.475                        |
| 013016MD  | Orion 2-electrode conductivity cell with flow cell, K=0.1                 |
| 011008    | Orion conductivity standard, 100 µS/cm, 5 x 60 mL bottles                 |
| 011007    | Orion conductivity standard, 1413 µS/cm, 5 x 60 mL bottles                |
| 011006    | Orion conductivity standard, 12.9 mS/cm, 5 x 60 mL bottles                |
| 1010001   | Orion conductivity calibration resistor kit                               |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A216 pH/RDO/Dissolved Oxygen Benchtop Meter

The Thermo Scientific Orion Star A216 pH/RDO/Dissolved Oxygen Benchtop Meter is great for checking pH and dissolved oxygen levels at the same time from various wastewater samples. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows individual pH/mV/RmV result, dissolved oxygen in percent saturation or concentration results with temperature, or all results at once. Additional helpful information includes electrode status, time, date, sample ID, user ID and calibration. For advanced users, features such as stability and averaging choices provide additional options.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers and calibration editing to fix errors without a complete recalibration
- No need to worry about DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- Accurate DO results are easier with automatic temperature, manual salinity and automatic/manual barometric pressure compensation
- Calibrate DO by using water-saturated air, air-saturated water, a Winkler titration or zero point calibration
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- To mix samples without a stir plate or for faster BOD readings, meter can directly control the 096019 Orion Star stirrer or 086030MD Orion AUTO-STIR™ DO probes (each sold separately)
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- IP54-rated housing handles splashes and is wall-mountable if table space is a problem
- 3 year meter replacement warranty



### Product Specifications

| CE   TUV   FCC    |                                       |   |
|-------------------|---------------------------------------|---|
| pH                | Range                                 | -2.000 to 20.000  |
|                   | Resolution                            | 0.1, 0.01, 0.001  |
|                   | Relative Accuracy                     | ±0.002  |
|                   | Calibration Points                    | Up to 5   |
|                   | Calibration Editing                   | Yes   |
| mV/Rel mV/<br>ORP | Range                                 | ±2000.0 mV  |
|                   | Resolution                            | 0.1   |
|                   | Relative Accuracy                     | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                   | E <sub>i</sub> ORP Mode               | Yes   |
| Dissolved Oxygen  | <b>Concentration - Polarographic</b>  |   |
|                   | Range                                 | 0 to 90 mg/L  |
|                   | Resolution                            | 0.01, 0.1   |
|                   | Relative Accuracy                     | ±0.2  |
|                   | <b>% Saturation - Polarographic</b>   |   |
|                   | Range                                 | 0 to 600  |
|                   | Resolution                            | 0.1, 1  |
|                   | Relative Accuracy                     | ±2 %  |
|                   | <b>Concentration - RDO</b>            |   |
|                   | Range                                 | 0 to 50 mg/L  |
|                   | Resolution                            | 0.01, 0.1   |
|                   | Relative Accuracy                     | ±0.1 mg/L up to 8 mg/L;<br>±0.2 mg/L from 8 to 20 mg/L;<br>10 % of reading from 20 to 50 mg/L |
|                   | <b>% Saturation - RDO</b>             |   |
|                   | Range                                 | 0 to 500  |
|                   | Resolution                            | 0.1, 1  |
|                   | Relative Accuracy                     | ±2 %  |
|                   | Manual Barometric Pressure Correction | 450.0 to 850.0 mm Hg  |
|                   | Manual Salinity Factor Correction     | 0 to 45 ppt   |
|                   | Calibration Features                  | Water-saturated air, air saturated water, manual (Winkler) and zero point                     |
|                   | Probe Characteristics                 | Polarographic or RDO  |
| Temperature       | Range                                 | 0 to 50 °C, 32 to 122 °F  |
|                   | Resolution                            | 0.1   |
|                   | Relative Accuracy                     | ±0.1  |
|                   | Offset Calibration                    | 1 point   |
| Datalogging       | Number of Datalogs                    | 2000 with time and date stamp   |
|                   | Log Function                          | Manual, ready (includes AUTO-READ™), timed  |
| Inputs            | pH Electrode                          | BNC, reference pin  |
|                   | DO with Temp. Probe                   | 9-pin mini-DIN  |
| Output            |                                       | RS232, USB  |
| Power             | AC Adapter                            | Optional – universal, 100-240 VAC   |
|                   | Battery Power                         | Optional – 4 AAs  |
|                   | Battery Life                          | 800 hrs   |

### Meter Ordering Information

| Cat. No.  | Description  |
|-----------|--|
| STARA2160 | <b>Orion Star A216 pH/Dissolved Oxygen Benchtop Multiparameter Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| STARA2165 | <b>Orion Star A216 pH/Dissolved Oxygen Benchtop Multiparameter Meter Kit</b><br>- 8157BNUMD Orion ROSS Ultra Triode pH/ATC electrode<br>- 083005MD Orion polarographic DO probe with calibration sleeve<br>- 080513 polarographic DO probe maintenance kit<br>- BOD adapter, funnel and stirrer<br>- 810199 ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

### Accessories

| Cat. No.  | Description  |
|-----------|--|
| 096019    | Orion Star stirrer probe   |
| STARA-BEA | Benchtop electrode arm for Orion Star A-series meters                                  |
| STARA-HB  | Freestanding base for use with Orion Star A-series benchtop electrode arm              |
| 8302BNUMD | Orion ROSS Triode 3-in-1 pH/ATC probe, refillable, glass body                          |
| 8102BNUWP | Orion ROSS Ultra refillable pH electrode, glass body                                   |
| 927007MD  | Orion ATC probe, stainless steel   |
| 810199    | Orion ROSS All-in-One pH buffer kit  |
| 910104    | Orion pH 4.01 buffer, 475 mL   |
| 910107    | Orion pH 7.00 buffer, 475 mL   |
| 910110    | Orion pH 10.01 buffer, 475 mL  |
| 083005MD  | Orion polarographic DO probe, 1.5m cable   |
| 086030MD  | Orion polarographic AUTO-STIR DO/BOD probe, 1.5m cable                                 |
| 087010MD  | Orion RDO optical DO probe, 3m cable with stainless steel guard and calibration sleeve |
| 970802    | Orion BOD funnel and stirrer for use with polarographic probes                         |
| 080360    | Orion BOD bottle adapter for use with polarographic probes                             |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion VERSA STAR 10 & 80 pH and pH with LogR™ Technology Benchtop Meters

Routine pH measurements are quick and easy with the Orion VERSA STAR 10 and 80 pH benchtop meters. The large color display is easy on to read and easy on the eyes. Prompts make accuracy and repeatability easy for even the most complicated testing. If you need to add more channels for more or obtain more parameters from the same, simply remove the protective individual channel cover and add the new module.

The Orion VERSA STAR 10 pH benchtop meter comes complete with a single channel pH module, offering:

- Up to 6 point pH calibration with automatic recognition for USA/NIST and DIN buffers and electrode identification
- The time-saving option to fix errors without a complete recalibration with the calibration editing function

The Orion VERSA STAR 80 pH with LogR technology benchtop meter includes one LogR module, which fits easily into two channel slots. This technology allows for:

- Having all the features of the VERSA STAR 10 pH benchtop meter
- Preventing wasted efforts and time from bad electrodes by offering the most advanced electrode diagnostics
- Using even less of those expensive samples for testing and still getting accurate pH results since LogR technology allows for temperature-compensated pH readings without a temperature sensor

### Features and Benefits

- Versatility is the name of the game
  - Customize the display to show only the information you need
  - Change out modules to create the meter you need at any time
- Anyone can use this meter with its plain language screen prompts, function keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals or just once with single-shot mode
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods per channel allow for customized procedures to differentiate between tests and/or users
- Two USB and a RS232 port makes for easy data transfer and updating meter software
- Includes data analysis software for easy transferring of stored results or real-time viewing

- Control sample mixing directly from the meter without a separate stir plate when using with the Orion Star stirrer probe (cat. no. 096019, sold separately)
- Increase your productivity – with two Orion stirrer probe ports, add stirrers and modules to analyze two separate samples at the same time
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source through the included universal power adapter
- IP54-rated housing handles splashes and cleans up easily
- 3 year meter replacement warranty

### Product Specifications – Orion VERSA STAR Meter

|                                       |                           | CE   TUV   EPA   |
|---------------------------------------|---------------------------|--|
| <b>Maximum Number of Modules</b>      |                           | 4  |
| <b>Methods</b>                        |                           | Up to 10   |
| <b>Datalogging</b>                    | <b>Number of Datalogs</b> | 2000 with time and date stamp                            |
|                                       | <b>Log Function</b>       | Manual, AUTO-READ™, timed interval, single timed reading |
| <b>Communication Ports</b>            |                           | One RS232, two USB ports (one client, one host)          |
| <b>Orion Star Stirrer Probe Ports</b> |                           | 2  |
| <b>Power</b>                          |                           | Universal, AC power adapter, 90-260 VAC, 50-60 Hz        |





**Product Specifications – pH Module (VSTAR-PH)**

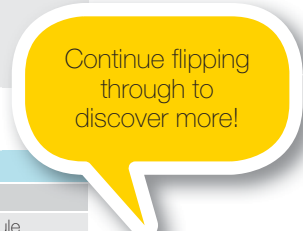
| CE   TUV   EPA |                         |  |
|----------------|-------------------------|--|
| pH             | Range                   | -2.000 to 20.000                                   |
|                | Resolution              | 0.1, 0.01, 0.001                                   |
|                | Relative Accuracy       | ±0.002   |
|                | Calibration Points      | Up to 6  |
|                | Calibration Editing     | Yes  |
|                | Adjustable ISO Point    | Yes  |
| mV/Rel mV/ ORP | Range                   | ±2000.0 mV   |
|                | Resolution              | 0.1  |
|                | Relative Accuracy       | ±0.2 mV or ±0.05 % of reading whichever is greater |
|                | E <sub>n</sub> ORP Mode | Yes  |
| Temperature    | Range                   | -5 to 105 °C, 23 to 221 °F                         |
|                | Resolution              | 0.1  |
|                | Relative Accuracy       | ±0.1   |
|                | Offset Calibration      | 1 point  |
| Inputs         | pH/ISE                  | BNC, reference pin                                 |
|                | ATC                     | 8-pin mini-DIN                                     |

**Product Specifications – pH/LogR Module (VSTAR-LR)**

| CE   TUV   EPA                              |                         |  |
|---|-------------------------|--|
| pH  | Range                   | -2.000 to 20.000                                   |
|   | Resolution              | 0.1, 0.01, 0.001                                   |
|   | Relative Accuracy       | ±0.002   |
|   | Calibration Points      | Up to 6  |
|   | Calibration Editing     | Yes  |
|   | Adjustable ISO Point    | Yes  |
| mV/Rel mV/ ORP                              | Range                   | ±2000.0 mV   |
|   | Resolution              | 0.1  |
|   | Relative Accuracy       | ±0.2 mV or ±0.05 % of reading whichever is greater |
|   | E <sub>n</sub> ORP Mode | Yes  |
| LogR Temperature                            | Range                   | 0 to 100 °C, 32 to 212 °F                          |
|   | Resolution              | 0.1  |
|   | Relative Accuracy       | ±0.5   |
|   | Resistance Range        | 0 to 6000 MΩ                                       |
|   | Resistance Resolution   | 0.1 MΩ up to 1999.9 MΩ, 1 MΩ above 1999.9 MΩ       |
|   | Offset Calibration      | Up to 3 points                                     |
|   | Calibration Options     | ATC probe, NIST reference                          |
| Temperature Measurement without LogR In-Use | Range                   | -5 to 105 °C, 23 to 221 °F                         |
|   | Resolution              | 0.1  |
|   | Relative Accuracy       | ±0.1   |
|   | Offset Calibration      | 1 point  |
| Inputs                                      | pH                      | BNC, reference pin                                 |
|   | ATC                     | 8-pin mini-DIN                                     |

**Meter Ordering Information**

| Cat. No. | Description   |
|----------|---|
| VSTAR10  | <b>Orion VERSA STAR pH Benchtop Meter Set</b><br>- Orion VERSA STAR meter with pH/temperature module<br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| VSTAR12  | <b>Orion VERSA STAR pH Benchtop Meter Kit</b><br>- Orion VERSA STAR meter with pH/temperature module<br>- 8302BNUMD Orion ROSS Triode pH/ATC probe<br>- 096019 Orion Star stirrer probe<br>- 810199 ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| VSTAR80  | <b>Orion VERSA STAR pH with LogR Benchtop Meter Set</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR pH/temperature with LogR technology module<br>- 927007MD ATC probe, stainless steel<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| VSTAR82  | <b>Orion VERSA STAR pH Benchtop Meter Kit</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR pH/temperature with LogR technology module<br>- 8172BNWP Orion ROSS Sure-Flow pH electrode<br>- 927007MD ATC probe, stainless steel<br>- ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- 810007 ROSS fill solution, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter |



**Accessories**

| Cat. No.  | Description  |
|-----------|--|
| VSTAR-ISE | Orion VERSA STAR pH/ISE/temperature module                 |
| VSTAR-CND | Orion VERSA STAR conductivity/temperature module           |
| VSTAR-RD  | Orion VERSA STAR RDO/DO/temperature module                 |
| 096019    | Orion Star stirrer probe                                   |
| 8102BNUWP | Orion ROSS Ultra pH electrode, refillable, glass body      |
| 8172BNWP  | Orion ROSS Sure-Flow pH electrode, glass body              |
| 8156BNUWP | Orion ROSS Ultra refillable pH electrode, epoxy body       |
| 8157BNUMD | Orion ROSS Triode pH/ATC electrode, refillable, epoxy body |
| 8302BNUMD | Orion ROSS Triode pH/ATC electrode, refillable, glass body |
| 927007MD  | Orion ATC probe, stainless steel body                      |
| 927005MD  | Orion ATC probe, epoxy body                                |
| 810199    | Orion ROSS all-in-one pH buffer kit                        |
| 910104    | Orion pH 4.01 buffer, 475 mL                               |
| 910107    | Orion pH 7.00 buffer, 475 mL                               |
| 910110    | Orion pH 10.01 buffer, 475 mL                              |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A211 pH Benchtop Meter

The Thermo Scientific Orion Star A211 pH Benchtop Meter is the ideal choice for dedicated pH testing in water, process, research and QA/QC samples. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows pH/mV/RmV and temperature along with electrode status, time, date, sample ID, user ID and calibration points. For advanced users, features such as stability and averaging choices provide additional options.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Fix calibration errors without a complete recalibration with calibration editing
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Mix samples without a stir plate with direct control of the Orion Star stirrer probe (096019, sold separately)
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- IP54-rated housing handles splashes and is wall-mountable if table space is a problem
- 3 year meter replacement warranty







## Product Specifications

| CE   TUV   FCC        |                               |  |
|-----------------------|-------------------------------|--|
| <b>pH</b>             | <b>Range</b>                  | -2.000 to 20.000                                   |
|                       | <b>Resolution</b>             | 0.1, 0.01, 0.001                                   |
|                       | <b>Relative Accuracy</b>      | ±0.002   |
|                       | <b>Calibration Points</b>     | Up to 5  |
|                       | <b>Calibration Editing</b>    | Yes  |
| <b>mV/Rel mV/ ORP</b> | <b>Range</b>                  | ±2000.0 mV   |
|                       | <b>Resolution</b>             | 0.1  |
|                       | <b>Relative Accuracy</b>      | ±0.2 mV or ±0.05 % of reading whichever is greater |
|                       | <b>E<sub>s</sub> ORP Mode</b> | Yes  |
| <b>Temperature</b>    | <b>Range</b>                  | -5 to 105 °C, 23 to 221 °F                         |
|                       | <b>Resolution</b>             | 0.1  |
|                       | <b>Relative Accuracy</b>      | ±0.1   |
|                       | <b>Offset Calibration</b>     | 1 point  |
| <b>Datalogging</b>    | <b>Number of Datalogs</b>     | 2000 with time and date stamp                      |
|                       | <b>Log Function</b>           | Manual, ready (includes AUTO-READ™), timed         |
| <b>Inputs</b>         | <b>pH Electrode</b>           | BNC, reference pin                                 |
|                       | <b>ATC Probe</b>              | 8-pin mini-DIN                                     |
| <b>Output</b>         |                               | RS232, USB   |
| <b>Power</b>          | <b>AC Adapter</b>             | Included – universal, 100-240 VAC                  |
|                       | <b>Battery Power</b>          | Optional – 4 AAs                                   |
|                       | <b>Battery Life</b>           | 800 hrs  |

## Meter Ordering Information

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA2110</b> | <b>Orion Star A211 pH Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| <b>STARA2115</b> | <b>Orion Star A211 pH Benchtop Meter Kit</b><br>- 8302BNUMD Orion ROSS Triode 3-in-1 pH/ATC probe<br>- 810199 ROSS solution kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; cleaning solution; and pH electrode storage bottle)<br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| <b>STARA2116</b> | <b>Orion Star A211 pH Benchtop Meter Kit with pH/ATC Triode Electrode</b><br>- 8157BNUMD Orion ROSS Ultra pH/ATC Triode electrode with epoxy body, refillable<br>- 810199 All-in-One pH Buffer Kit (475 mL each of pH 4, 7 and 10 buffers; storage solution; and pH electrode storage bottle)<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

## Accessories

| Cat. No.         | Description   |
|------------------|---|
| <b>096019</b>    | Orion Star stirrer probe  |
| <b>STARA-BEA</b> | Benchtop electrode arm for Orion Star A-series meters                     |
| <b>STARA-HB</b>  | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| <b>8302BNUMD</b> | Orion ROSS Triode 3-in-1 pH/ATC probe, refillable, glass body             |
| <b>8102BNUWP</b> | Orion ROSS Ultra refillable pH electrode, glass body                      |
| <b>927007MD</b>  | Orion ATC probe, stainless steel  |
| <b>810199</b>    | Orion ROSS All-in-One pH buffer kit                                       |
| <b>910199</b>    | Orion Standard All-in-One pH buffer kit                                   |
| <b>910104</b>    | Orion pH 4.01 buffer, 475 mL  |
| <b>910107</b>    | Orion pH 7.00 buffer, 475 mL  |
| <b>910110</b>    | Orion pH 10.01 buffer, 475 mL   |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A111 pH Benchtop Meter

Thermo Scientific Orion Star A111 pH Benchtop Meters combine simplicity with accuracy for dedicated pH applications. A large LCD displays pH or mV readings along with temperature. Icons provide quick updates on battery life, electrode status and calibration information. Simple button layout and onscreen messages help with calibration and setup menu choices.

### Features and Benefits

- Large, informative screen clearly shows the main information, including pH or mV reading, temperature in °C or °F, meter mode, calibration information and power source
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Up to 3 point pH calibration
- Automatic recognition of USA/NIST and DIN buffers
- Easily recall calibration slope data for procedure checks
- Non-volatile memory holds up to 50 data points
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Plug the meter into almost any power outlet with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- The IP54-rated housing can handle splashes and can be wall-mounted if table space is a problem
- 3 year meter replacement warranty





### Product Specifications

| CE   TUV   FCC |                                |  |
|----------------|--------------------------------|--|
| pH             | Range                          | -2.00 to 16.00                                     |
|                | Resolution                     | 0.1, 0.01  |
|                | Relative Accuracy              | ±0.01  |
|                | pH Calibration Points          | Up to 3  |
| mV/Rel mV/ ORP | Range - mV                     | ±1600.0 mV   |
|                | Range - RmV                    | ±1999.9 mV   |
|                | Resolution                     | 0.1  |
|                | Relative Accuracy              | ±0.2 mV or ±0.05 % of reading whichever is greater |
|                | E <sub>a</sub> ORP Mode        | No   |
| Temperature    | Range                          | -5 to 105 °C, 23 to 221 °F                         |
|                | Resolution                     | 0.1  |
|                | Relative Accuracy              | ±0.1   |
|                | Temperature Compensation       | Automatic or manual                                |
|                | Temperature Offset Calibration | Yes  |
| Datalogging    | Number of Datalogs             | 50   |
|                | Log Function                   | Manual, Automatic with AUTO-READ™                  |
| Inputs         | pH Electrode                   | BNC  |
|                | ATC Probe                      | 8-pin mini-DIN                                     |
| Power          | AC Adapter                     | Included – universal, 100-240 VAC                  |
|                | Battery Power                  | Optional – 4 AAs                                   |
|                | Battery Life                   | 2000 hrs   |

### Meter Ordering Information

| Cat. No.  | Description  |
|-----------|--|
| STARA1110 | <b>Orion Star A111 pH Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| STARA1115 | <b>Orion Star A111 pH Benchtop Meter Kit</b><br>- 9157BNMD Orion Triode 3-in-1 pH/ATC probe<br>- Solution kit (60 mL each of pH 4, 7 and 10 buffers; storage solution and cleaning solution)<br>- Electrode arm with redesigned holder<br>- Universal power adapter                        |
| STARA1116 | <b>Orion Star A111 pH Benchtop Meter Kit with TRIS-compatible Electrode</b><br>- GD9156BNWP Orion Green combination double-junction refillable pH electrode with epoxy body<br>- 927007MD stainless steel ATC probe<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

### Accessories

| Cat. No.  | Description  |
|-----------|--|
| STARA-BEA | Benchtop electrode arm for Orion Star A-series meters  |
| STARA-HB  | Freestanding base for use with Orion Star A-series benchtop electrode arm  |
| 9157BNMD  | Orion Triode 3-in-1 pH/ATC probe, refillable, epoxy body   |
| 9107BNMD  | Orion Triode 3-in-1 pH/ATC probe, gel-filled, epoxy body   |
| 910199    | Orion Standard All-in-One pH buffer kit - 475 mL each of 4.01, 7.00 and 10.01 buffers and pH electrode storage solution with pH electrode storage bottle |
| 810199    | Orion ROSS All-in-One pH buffer kit  |
| 910104    | Orion pH 4.01 buffer, 475 mL   |
| 910107    | Orion pH 7.00 buffer, 475 mL   |
| 910110    | Orion pH 10.01 buffer, 475 mL  |
| 910001    | Orion pH electrode storage solution, 475 mL  |
| 916099    | Orion pH buffer assortment pack – 60 mL each of pH 4, 7 and 10 buffers; storage solution and cleaning solution D   |



We are here to bring you the best. Continue to flip the page for more innovative finds.

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion VERSA STAR 20

### Conductivity Benchtop Meters

Conductivity tests can be as clear as ultrapure water samples. The large color display is easy on to read and easy on the eyes. Prompts make accuracy and repeatability easy for even the most complicated testing. If you need to add more channels for more or obtain more parameters from the same, simply remove the protective individual channel cover and add the new module.



#### Features and Benefits

- Versatility is the name of the game
  - Customize the display to show only the information you need
  - Change modules to create the meter you need at any time
- Selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C
- Linear, non-linear, nLFu or USP/EP curve options to get the most accurate conductivity result for your sample and temperature
- Choice of practical salinity or natural sea water curves for salinity readings
- Linear or ISO/EN 27888 curves for TDS
- Anyone can use this meter with its plain language screen prompts, function keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals or just once with single-shot mode
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods per channel allow for customized procedures to differentiate between tests and/or users
- Two USB and a RS232 port makes for easy data transfer and updating meter software
- Includes data analysis software for easy transferring of stored results or real-time viewing
- Control sample mixing directly from the meter without a separate stir plate when using with the Orion Star stirrer probe (cat. no. 096019, sold separately)
- Increase your productivity – with two Orion stirrer probe ports, add stirrers and modules to analyze two separate samples at the same time
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source through the included universal power adapter
- IP54-rated housing handles splashes and cleans up easily
- 3 year meter replacement warranty



### Product Specifications – Orion VERSA STAR Meter

| CE   TUV   EPA                 |   |  |
|--------------------------------|---|--|
| Maximum Number of Modules      | 4   |  |
| Methods                        | Up to 10  |  |
| Datalogging                    | Number of Datalogs                                | 2000 with time and date stamp                            |
|                                | Log Function                                      | Manual, AUTO-READ™, timed interval, single timed reading |
| Communication Ports            | One RS232, two USB ports (one client, one host)   |  |
| Orion Star Stirrer Probe Ports | 2   |  |
| Power                          | Universal, AC power adapter, 90-260 VAC, 50-60 Hz |  |

### Meter Ordering Information

| Cat. No.       | Description   |
|----------------|---|
| <b>VSTAR20</b> | <b>Orion VERSA STAR Conductivity Benchtop Meter Set</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR conductivity/temperature module<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| <b>VSTAR22</b> | <b>Orion VERSA STAR Conductivity Benchtop Meter Kit</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR conductivity/temperature module<br>- 013005MD Orion DuraProbe conductivity cell, K=0.475<br>- 011007 conductivity standard, 1413 µS, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

### Product Specifications – Conductivity Module (VSTAR-CND)

| CE   TUV   EPA |                           |  |
|----------------|---------------------------|--|
| Conductivity   | Range                     | 0.001 µS to 3000 mS                                |
|                | Resolution                | 0.001 µS minimum;<br>4 significant figures minimum |
|                | Relative Accuracy         | 0.5 % reading ±1 digit                             |
|                | Reference Temperature     | 5, 10, 15, 20, 25 °C                               |
|                | Temperature Compensation  | Linear (0 to 10.0 %/°C), nLn, nLFu, USP/EP         |
|                | Compatible Cell Constants | 0.001 to 199.9                                     |
|                | Calibration Points        | Up to 6 points                                     |
|                | Calibration Editing       | Yes  |
| Resistivity    | Range                     | 2 ohm to 100 meg-ohm                               |
|                | Resolution                | 2 ohms-cm  |
|                | Relative Accuracy         | 0.5 % reading ±1 digit                             |
| Salinity       | Type                      | Practical salinity or natural sea water            |
|                | Range                     | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water       |
|                | Resolution                | 0.01   |
|                | Relative Accuracy         | ±0.1   |
| TDS            | Range                     | 0 to 200 ppt                                       |
|                | Resolution                | 4 significant digits                               |
|                | Relative Accuracy         | ±0.5 % reading ±1 digit                            |
|                | TDS Factor Range          | Linear 0.01 to 10.00                               |
| Temperature    | Range                     | -5 to 105 °C, 23 to 221 °F                         |
|                | Resolution                | 0.1  |
|                | Relative Accuracy         | ±0.1   |
|                | Offset Calibration        | 1 point  |
| Input          | 8-pin mini-DIN            |  |

### Accessories

| Cat. No.         | Description   |
|------------------|---|
| <b>VSTAR-PH</b>  | Orion VERSA STAR pH/temperature module                                    |
| <b>VSTAR-ISE</b> | Orion VERSA STAR pH/ISE/temperature module                                |
| <b>VSTAR-CND</b> | Orion VERSA STAR conductivity/temperature module                          |
| <b>VSTAR-RD</b>  | Orion VERSA STAR RDO/DO/temperature module                                |
| <b>VSTAR-LR</b>  | Orion VERSA STAR pH/temperature with LogR technology module               |
| <b>STARA-BEA</b> | Benchtop electrode arm for Orion Star A-series meters                     |
| <b>STARA-HB</b>  | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| <b>STARA-PWR</b> | Replacement universal power adapter for Orion VERSA STAR meters           |
| <b>096019</b>    | Orion Star stirrer probe  |
| <b>013005MD</b>  | Orion DuraProbe conductivity cell, 4-cell, K=0.475                        |
| <b>013016MD</b>  | Orion conductivity cell, flow through, K=0.1                              |
| <b>011008</b>    | Orion conductivity standard, 100 µS/cm, 5 x 60 mL bottles                 |
| <b>011007</b>    | Orion conductivity standard, 1413 µS/cm, 5 x 60 mL bottles                |
| <b>011006</b>    | Orion conductivity standard, 12.9 mS/cm, 5 x 60 mL bottles                |
| <b>1010001</b>   | Orion conductivity calibration resistor kit                               |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A212 Conductivity Benchtop Meter

The Thermo Scientific Orion Star A212 Conductivity Benchtop Meter is the ideal choice to help meet USP requirements. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows conductivity/TDS/salinity/resistivity and temperature along with time, date, sample ID, user ID and calibration information. For advanced users, features such as stability and averaging choices provide additional options.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Selectable cell constant allows for use with 2- or 4-cell conductivity cells
- For accurate results, selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C with linear, non-linear, nLFu or USP/EP curve options
- Choice of practical salinity or natural sea water curves for salinity readings
- Linear or ISO/EN 27888 curves for TDS
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Mix samples without a stir plate with direct control of the Orion Star stirrer probe (096019, sold separately)
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- IP54-rated housing handles splashes and is wall-mountable if table space is a problem
- 3 year meter replacement warranty



### Product Specifications

| CE   TUV   FCC |                                     |   |
|----------------|-------------------------------------|---|
| Conductivity   | Range                               | 0.001 $\mu$ S to 3000 mS                                  |
|                | Resolution                          | 0.001 $\mu$ S minimum;<br>4 significant figures minimum   |
|                | Relative Accuracy                   | 0.5 % reading $\pm$ 1 digit                               |
|                | Reference Temperature               | 5, 10, 15, 20, 25 $^{\circ}$ C                            |
|                | Temperature Compensation            | Linear (0 to 10.0 $\%$ / $^{\circ}$ C), nLn, nLFu, USP/EP |
|                | Compatible Cell Constants           | 0.001 to 199.9  |
|                | Calibration Points                  | Up to 5 points  |
|                | Calibration Editing                 | Yes   |
| Resistivity    | Range                               | 2 ohm to 100 meg-ohm                                      |
|                | Resolution                          | 2 ohms-cm   |
|                | Relative Accuracy                   | 0.5 % reading $\pm$ 1 digit                               |
| Salinity       | Type                                | Practical salinity or natural sea water                   |
|                | Range                               | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water              |
|                | Resolution                          | 0.01  |
|                | Relative Accuracy                   | $\pm$ 0.1   |
| TDS            | Range                               | 1 to 200 ppt  |
|                | Resolution                          | 4 significant digits                                      |
|                | Relative Accuracy                   | $\pm$ 0.5 % reading $\pm$ 1 digit                         |
|                | TDS Factor Range                    | Linear, 0.01 to 10.00                                     |
| Temperature    | Range                               | -5 to 105 $^{\circ}$ C, 23 to 221 $^{\circ}$ F            |
|                | Resolution                          | 0.1   |
|                | Relative Accuracy                   | $\pm$ 0.1   |
|                | Offset Calibration                  | 1 point   |
| Datalogging    | Number of Datalogs                  | 2000 with time and date stamp                             |
|                | Log Function                        | Manual, ready (includes AUTO-READ <sup>™</sup> ), timed   |
| Inputs         | Conductivity with Temperature Probe | 8-pin mini-DIN  |
| Output         |                                     | RS232, USB  |
| Power          | AC Adapter                          | Included – universal, 100-240 VAC                         |
|                | Battery Power                       | Optional – 4 AAs  |
|                | Battery Life                        | 800 hrs   |

### Meter Ordering Information

| Cat. No.  | Description  |
|-----------|--|
| STARA2120 | <b>Orion Star A212 Conductivity Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| STARA2125 | <b>Orion Star A212 Conductivity Benchtop Meter Kit</b><br>- 013005MD Orion DuraProbe conductivity probe, K=0.475<br>- 011007 conductivity standard, 1413 $\mu$ S, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter                               |
| STARA2126 | <b>Orion Star A212 Conductivity Benchtop Meter Kit for Ultrapure Water</b><br>- 013016MD Orion conductivity probe with flow-through cell, K=0.1<br>- 011008 conductivity standard, 100 $\mu$ S, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

### Accessories

| Cat. No.  | Description   |
|-----------|---|
| STARA-BEA | Benchtop electrode arm for Orion Star A-series meters                     |
| STARA-HB  | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| 013005MD  | Orion DuraProbe conductivity probe, 4-cell, K=0.475                       |
| 013016MD  | Orion 2-electrode conductivity probe with flow cell, K=0.1                |
| 011008    | Orion conductivity standard, 100 $\mu$ S/cm, 5 x 60 mL bottles            |
| 011007    | Orion conductivity standard, 1413 $\mu$ S/cm, 5 x 60 mL bottles           |
| 011006    | Orion conductivity standard, 12.9 mS/cm, 5 x 60 mL bottles                |
| 1010001   | Orion conductivity calibration resistor kit                               |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A112 Conductivity Benchtop Meter

Thermo Scientific Orion Star A112 Conductivity Benchtop Meters combine simplicity with accuracy for dedicated conductivity measurements. A large LCD displays conductivity or TDS readings along with temperature. Icons provide quick updates on battery life and completed calibration status. Simple button layout and onscreen messages help with calibration and setup menu choices.

### Features and Benefits

- Large, informative screen clearly shows the main information, including conductivity or TDS reading, temperature in °C or °F, meter mode and power source
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Selectable cell constant
- Selectable reading reference temperatures of 20 °C or 25 °C for an accurate result
- Included electrode arm and newly-designed holder make it easier to maintain and place probes into samples
- Plug the meter into almost any power outlet with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- Non-volatile memory holds up to 50 data points
- The IP54-rated housing can handle splashes and can be wall-mounted if table space is a problem
- 3 year meter replacement warranty







### Product Specifications

| CE   TUV   FCC      |  |  |
|---------------------|--|--|
| <b>Conductivity</b> | <b>Range</b>                               | 0.1 $\mu$ S/cm to 200 mS/cm                            |
|                     | <b>Resolution</b>                          | 0.01 $\mu$ S minimum;<br>3 significant figures minimum |
|                     | <b>Relative Accuracy</b>                   | 0.5 % reading $\pm$ 1 digit                            |
|                     | <b>Reference Temperature</b>               | 20, 25 $^{\circ}$ C (default)                          |
|                     | <b>Temperature Compensation</b>            | Linear (0.0 to 10.0 %/ $^{\circ}$ C)                   |
|                     | <b>Compatible Cell Constants</b>           | 0.001 to 10  |
|                     | <b>Calibration Points</b>                  | 1  |
| <b>TDS</b>          | <b>Range</b>                               | 1 to 19,999 mg/L                                       |
|                     | <b>Resolution</b>                          | 4 significant digits                                   |
|                     | <b>Relative Accuracy</b>                   | 0.5 % reading $\pm$ 1 digit                            |
|                     | <b>TDS Factor Range</b>                    | Linear, 0.01 to 10.00, default 0.49                    |
| <b>Temperature</b>  | <b>Range</b>                               | -5 to 105 $^{\circ}$ C, 23 to 221 $^{\circ}$ F         |
|                     | <b>Resolution</b>                          | 0.1  |
|                     | <b>Relative Accuracy</b>                   | $\pm$ 0.1  |
|                     | <b>Offset Calibration</b>                  | Yes  |
| <b>Datalogging</b>  | <b>Number of Datalogs</b>                  | 50   |
|                     | <b>Log Function</b>                        | Manual, Automatic with AUTO-READ™                      |
| <b>Inputs</b>       | <b>Conductivity with Temperature Probe</b> | 8-pin mini-DIN   |
| <b>Power</b>        | <b>AC Adapter</b>                          | Included – universal, 100-240 VAC                      |
|                     | <b>Battery Power</b>                       | Optional – 4 AAs                                       |
|                     | <b>Battery Life</b>                        | 2000 hrs   |

### Meter Ordering Information

| Cat. No.         | Description   |
|------------------|---|
| <b>STARA1120</b> | <b>Orion Star A112 Conductivity Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| <b>STARA1125</b> | <b>Orion Star A112 Conductivity Benchtop Meter Kit</b><br>- 011050MD orion conductivity cell, K=1.0<br>- 011007 conductivity standard, 1413 $\mu$ S, 5 x 60 mL<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

### Accessories

| Cat. No.         | Description   |
|------------------|---|
| <b>STARA-BEA</b> | Benchtop electrode arm for Orion Star A-series meters                     |
| <b>STARA-HB</b>  | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| <b>011050MD</b>  | Orion 2-electrode conductivity cell, K=1.0                                |
| <b>013016MD</b>  | Orion 2-electrode conductivity cell with flow cell, K=0.1                 |
| <b>011008</b>    | Orion conductivity standard, 100 $\mu$ S/cm, 5 x 60 mL bottles            |
| <b>011007</b>    | Orion conductivity standard, 1413 $\mu$ S/cm, 5 x 60 mL bottles           |
| <b>011006</b>    | Orion conductivity standard, 12.9 mS/cm, 5 x 60 mL bottles                |
| <b>1010001</b>   | Orion conductivity calibration resistor kit                               |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion VERSA STAR 30

RDO/Dissolved Oxygen Benchtop Meters

BOD testing is complicated enough – no need for the meter to add to the confusion. The large color display is easy on to read and easy on the eyes. Prompts make accuracy and repeatability easy for even the most complicated testing. If you need to add more channels for more or obtain more parameters from the same, simply remove the protective individual channel cover and add the new module.

Discover the most advanced features in our new Orion VERSA STAR meters.



### Features and Benefits

- Versatility is the name of the game
  - Customize the display to show only the information you need
  - Change modules to create the meter you need at any time
- Takes the worry out of DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- Compensates automatically for temperature, salinity with manual input and barometric pressure (automatic or manual)
- Allows for calibration using water-saturated air, air-saturated water, a Winkler titration or zero point
- Anyone can use this meter with its plain language screen prompts, function keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals or just once with single-shot mode
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods per channel allow for customized procedures to differentiate between tests and/or users
- Two USB and a RS232 port makes for easy data transfer and updating meter software
- Complimentary data analysis software for easy transferring of stored results, real-time viewing and calculation of BOD, DOUR and SOUR results
- Control sample mixing directly from the meter without a separate stir plate when using with the Orion Star stirrer probe (cat. no. 096019, sold separately)
- Increase your productivity – with two Orion Star stirrer probe ports, add stirrers and modules to analyze two separate samples at the same time
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source through the included universal power adapter
- IP54-rated housing handles splashes and cleans up easily
- 3 year meter replacement warranty



**Product Specifications – Orion VERSA STAR Meter**

| CE   TUV   EPA                        |   |  |
|---------------------------------------|---|--|
| <b>Maximum Number of Modules</b>      | 4   |  |
| <b>Methods</b>                        | Up to 10  |  |
| <b>Datalogging</b>                    | <b>Number of Datalogs</b>                         | 2000 with time and date stamp                            |
|                                       | <b>Log Function</b>                               | Manual, AUTO-READ™, timed interval, single timed reading |
| <b>Communication Ports</b>            | One RS232, two USB ports (one client, one host)   |  |
| <b>Orion Star Stirrer Probe Ports</b> | 2   |  |
| <b>Power</b>                          | Universal, AC power adapter, 90-260 VAC, 50-60 Hz |  |

**Meter Ordering Information**

| Cat. No.       | Description   |
|----------------|---|
| <b>VSTAR30</b> | <b>Orion VERSA STAR RDO/Dissolved Oxygen Benchtop Meter Set</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR dissolved oxygen/temperature module<br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| <b>VSTAR32</b> | <b>Orion VERSA STAR RDO/Dissolved Oxygen Benchtop Meter Kit</b><br>- Orion VERSA STAR meter<br>- Orion VERSA STAR dissolved oxygen/temperature module<br>- 083005MD Orion polarographic DO probe<br>- 080017 calibration sleeve for DO probe<br>- 080513 DO probe maintenance kit<br>- BOD adapter, funnel and stirrer<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

**Product Specifications – RDO/DO Module (VSTAR-RD)**

| CE   TUV   EPA              |   |   |
|-----------------------------|---|---|
| <b>Dissolved Oxygen</b>     | <b>Concentration - Polarographic</b>                                      |   |
|                             | <b>Range</b>  | 0 to 90 mg/L  |
|                             | <b>Resolution</b>   | 0.01, 0.1   |
|                             | <b>Relative Accuracy</b>  | ±0.2  |
|                             | <b>% Saturation - Polarographic</b>                                       |   |
|                             | <b>Range</b>  | 0 to 600  |
|                             | <b>Resolution</b>   | 0.1, 1  |
|                             | <b>Relative Accuracy</b>  | ±2 %  |
|                             | <b>Concentration - RDO</b>  |   |
|                             | <b>Range</b>  | 0 to 50 mg/L  |
|                             | <b>Resolution</b>   | 0.01, 0.1   |
|                             | <b>Relative Accuracy</b>  | ±0.1 mg/L up to 8 mg/L;<br>±0.2 mg/L from 8 to 20 mg/L;<br>10 % of reading, 20 to 50 mg/L |
|                             | <b>% Saturation - RDO</b>   |   |
|                             | <b>Range</b>  | 0 to 500  |
|                             | <b>Resolution</b>   | 0.1, 1  |
|                             | <b>Relative Accuracy</b>  | ±2 %  |
|                             | <b>Automatic Barometric Pressure Correction</b>                           | 450.0 to 850.0 mm Hg  |
|                             | <b>Salinity Factor Correction</b>   | Automatic when used with conductivity module and probe or manual; 0 to 45 ppt             |
| <b>Calibration Features</b> | Water saturated air, air saturated water, manual (Winkler) and zero point |   |
| <b>Probe Type</b>           | Polarographic or RDO  |   |
| <b>Temperature</b>          | <b>Range</b>  | 0 to 50 °C, 32 to 122 °F  |
|                             | <b>Resolution</b>   | 0.1   |
|                             | <b>Relative Accuracy</b>  | ±0.1  |
|                             | <b>Offset Calibration</b>   | 1 point   |
| <b>Input</b>                | 9-pin mini-DIN  |   |

**Accessories**

| Cat. No.         | Description   |
|------------------|---|
| <b>VSTAR-PH</b>  | Orion VERSA STAR pH/temperature module  |
| <b>VSTAR-ISE</b> | Orion VERSA STAR pH/ISE/temperature module  |
| <b>VSTAR-CND</b> | Orion VERSA STAR conductivity/temperature module  |
| <b>VSTAR-RD</b>  | Orion VERSA STAR RDO/DO/temperature module  |
| <b>VSTAR-LR</b>  | Orion VERSA STAR pH/temperature with LogR technology module   |
| <b>STARA-BEA</b> | Benchtop electrode arm for Orion Star A-series meters   |
| <b>STARA-HB</b>  | Freestanding base for use with Orion Star A-series benchtop electrode arm                                       |
| <b>STARA-PWR</b> | Replacement universal power adapter for Orion VERSA STAR meters   |
| <b>096019</b>    | Orion Star stirrer probe  |
| <b>083005MD</b>  | Orion dissolved oxygen probe, polarographic   |
| <b>086030MD</b>  | Orion auto-stir DO/BOD probe, polarographic   |
| <b>087010MD</b>  | Orion RDO optical DO probe, 3 m cable   |
| <b>080513</b>    | Maintenance kit, includes electrolyte solution, polishing disk, and two membrane caps for 083005MD and 086030MD |
| <b>080514</b>    | Polarographic electrolyte solution for 083005MD and 086030MD  |
| <b>086021A</b>   | Replacement calibration chamber/stand for 086030MD  |
| <b>087001</b>    | Replacement optical/luminescence-based cap  |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A213

RDO/Dissolved Oxygen Benchtop Meter

The Thermo Scientific Orion Star A213 RDO/Dissolved Oxygen (DO) Benchtop Meter is the ideal choice to ensure proper oxygen levels. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows dissolved oxygen in percent saturation or concentration and temperature along with time, date, sample ID, user ID and calibration information. For advanced users, features such as stability and averaging choices provide additional options.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- No need to worry about DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- Accurate results are easy with automatic temperature, manual salinity and your choice of automatic or manual barometric pressure compensation
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Calibrate using water-saturated air, air-saturated water, a Winkler titration or zero point calibration
- Non-volatile memory holds up to 2000 data points with time and date stamp
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- For faster BOD readings, control the Orion AUTO-STIR™ polarographic DO probe (086030MD, sold separately) directly from the meter
- Included electrode arm and newly-designed probe holder make it easier to maintain and place probes into samples
- Works with almost every AC power source with the included universal power adapter, or use four AA batteries (sold separately) to run the meter on DC power
- IP54-rated housing handles splashes and is wall-mountable if table space is a problem
- 3 year meter replacement warranty



## Product Specifications

|   |   | CE   TUV   FCC  |
|---|---|---|
| <b>Dissolved Oxygen</b>                         | <b>Concentration - Polarographic</b>                                      |   |
|   | <b>Range</b>  | 0 to 90 mg/L  |
|   | <b>Resolution</b>   | 0.01, 0.1   |
|   | <b>Relative Accuracy</b>  | ±0.2  |
|   | <b>% Saturation - Polarographic</b>                                       |   |
|   | <b>Range</b>  | 0 to 600  |
|   | <b>Resolution</b>   | 0.1, 1  |
|   | <b>Relative Accuracy</b>  | ±2 %  |
|   | <b>Concentration - RDO</b>  |   |
|   | <b>Range</b>  | 0 to 50 mg/L  |
|   | <b>Resolution</b>   | 0.01, 0.1   |
|   | <b>Relative Accuracy</b>  | ±0.1 mg/L up to 8 mg/L;<br>±0.2 mg/L from 8 to 20 mg/L;<br>10 % of reading from 20 to 50 mg/L |
|   | <b>% Saturation - RDO</b>   |   |
|   | <b>Range</b>  | 0 to 500  |
|   | <b>Resolution</b>   | 0.1, 1  |
| <b>Relative Accuracy</b>                        | ±2 %  |   |
| <b>Automatic Barometric Pressure Correction</b> | 450.0 to 850.0 mm Hg  |   |
| <b>Manual Salinity Factor Correction</b>        | 0 to 45 ppt   |   |
| <b>Calibration Features</b>                     | Water-saturated air, air saturated water, manual (Winkler) and zero point |   |
| <b>Probe Characteristics</b>                    | Polarographic or RDO  |   |
| <b>Temperature</b>                              | <b>Range</b>  | 0 to 50 °C, 32 to 122 °F  |
|   | <b>Resolution</b>   | 0.1   |
|   | <b>Relative Accuracy</b>  | ±0.1  |
|   | <b>Offset Calibration</b>   | 1 point   |
| <b>Datalogging</b>                              | <b>Number of Datalogs</b>   | 2000 with time and date stamp   |
|   | <b>Log Function</b>   | Manual, ready (includes AUTO-READ™), timed  |
| <b>Inputs</b>                                   | <b>DO with Temperature Probe</b>  | 9-pin mini-DIN  |
| <b>Output</b>                                   |   | RS232, USB  |
| <b>Power</b>                                    | <b>AC Adapter</b>   | Included – universal, 100-240 VAC   |
|   | <b>Battery Power</b>  | Optional – 4 AAs  |
|   | <b>Battery Life</b>   | 800 hrs   |

## Meter Ordering Information

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA2130</b> | <b>Orion Star A213 Dissolved Oxygen Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter  |
| <b>STARA2135</b> | <b>Orion Star A213 Dissolved Oxygen Benchtop Meter Kit</b><br>- 083005MD Orion polarographic DO probe with calibration sleeve<br>- 080513 polarographic DO probe maintenance kit<br>- BOD adapter, funnel and stirrer<br>- Electrode arm with redesigned holder<br>- Universal power adapter                     |
| <b>STARA2136</b> | <b>Orion Star A213 Dissolved Oxygen Benchtop Meter Kit with Self-Stirring Probe</b><br>- 086030MD Orion polarographic AUTO-STIR DO/BOD probe<br>- 080513 DO probe maintenance kit<br>- 080514 polarographic DO probe electrolyte solution<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

## Accessories

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA-BEA</b> | Benchtop electrode arm for Orion Star A-series meters                                  |
| <b>STARA-HB</b>  | Freestanding base for use with Orion Star A-series benchtop electrode arm              |
| <b>083005MD</b>  | Orion polarographic DO probe, 1.5m cable   |
| <b>086030MD</b>  | Orion polarographic AUTO-STIR DO/BOD probe, 1.5m cable                                 |
| <b>087010MD</b>  | Orion RDO optical DO probe, 3m cable with stainless steel guard and calibration sleeve |
| <b>080513</b>    | Orion polarographic DO probe maintenance kit   |
| <b>080514</b>    | Orion polarographic DO probe electrolyte solution, 60 mL                               |
| <b>080017</b>    | Calibration sleeve for Orion polarographic DO probes                                   |
| <b>087003</b>    | Replacement calibration sleeve for Orion RDO optical probes                            |
| <b>087001</b>    | Replacement optical cap for Orion RDO probes   |
| <b>970802</b>    | Orion BOD funnel and stirrer for use with polarographic probes                         |
| <b>080360</b>    | Orion BOD bottle adapter for use with polarographic probes                             |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A113

Dissolved Oxygen Benchtop Meter

Thermo Scientific Orion Star A113 Dissolved Oxygen Benchtop Meters combine simplicity with accuracy for dedicated DO testing. Icons provide quick updates on battery life and completed calibration status. Simple button layout and onscreen messages help with calibration and setup menu choices.

### Features and Benefits

- Large, informative screen clearly shows the main information, including DO reading in mg/L or % saturation, temperature in °C or °F, meter mode and power source
- Automatic temperature, manual salinity input and manual barometric pressure compensation for an accurate result
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Two calibration options to meet your requirements: water-saturated air method or a Winkler titration
- Accepts Thermo Scientific Orion polarographic dissolved oxygen probes
- Non-volatile memory holds up to 50 data points
- Included electrode arm and newly-designed holder make it easier to maintain and place probes into samples
- Plug the meter into almost any power outlet with the included universal power adapter, or use four AA batteries (sold separately)
- The IP54-rated housing can handle splashes and can be wall-mounted if table space is a problem
- 3 year meter replacement warranty





### Product Specifications

| CE   TUV   FCC              |  |                                   |
|-----------------------------|--|-----------------------------------|
| <b>Dissolved Oxygen</b>     | <b>Concentration</b>                         |                                   |
|                             | <b>Range</b>                                 | 0 to 20 mg/L                      |
|                             | <b>Resolution</b>                            | 0.01, 0.1                         |
|                             | <b>Relative Accuracy</b>                     | ±0.2                              |
|                             | <b>% Saturation</b>                          |                                   |
|                             | <b>Range</b>                                 | 0 to 200                          |
|                             | <b>Resolution</b>                            | 0.1, 1                            |
|                             | <b>Relative Accuracy</b>                     | ±2 %                              |
|                             | <b>Manual Barometric Pressure Correction</b> | 450.0 to 850.0 mm Hg              |
|                             | <b>Manual Salinity Factor Correction</b>     | 0 to 45 ppt                       |
| <b>Calibration Features</b> | Water-saturated air, manual (Winkler)        |                                   |
| <b>Sensor Type</b>          | Polarographic                                |                                   |
| <b>Temperature</b>          | <b>Range</b>                                 | 0 to 50 °C, 32 to 122 °F          |
|                             | <b>Resolution</b>                            | 0.1                               |
|                             | <b>Relative Accuracy</b>                     | ±0.1                              |
|                             | <b>Offset Calibration</b>                    | Yes                               |
| <b>Datalogging</b>          | <b>Number of Datalogs</b>                    | 50                                |
|                             | <b>Log Function</b>                          | Manual, Automatic with AUTO-READ™ |
| <b>Inputs</b>               | <b>DO with Temperature Probe</b>             | 9-pin mini-DIN                    |
| <b>Power</b>                | <b>Power Cord</b>                            | Included – universal, 100-240 VAC |
|                             | <b>Battery Power</b>                         | Optional – 4 AAs                  |
|                             | <b>Battery Life</b>                          | 2000 hrs                          |

### Meter Ordering Information

| Cat. No.         | Description   |
|------------------|---|
| <b>STARA1130</b> | <b>Orion Star A113 Dissolved Oxygen Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter   |
| <b>STARA1135</b> | <b>Orion Star A113 Dissolved Oxygen Benchtop Meter Kit</b><br>- 083005MD Orion polarographic DO probe<br>- 080017 calibration sleeve for DO probe<br>- 080513 DO probe maintenance kit<br>- Electrode arm with redesigned holder<br>- Universal power adapter |

### Accessories

| Cat. No.         | Description   |
|------------------|---|
| <b>STARA-BEA</b> | Benchtop electrode arm for Orion Star A-series meters                     |
| <b>STARA-HB</b>  | Freestanding base for use with Orion Star A-series benchtop electrode arm |
| <b>083005MD</b>  | Orion polarographic DO probe, 1.5m cable                                  |
| <b>080513</b>    | Orion polarographic DO probe maintenance kit                              |
| <b>080017</b>    | Calibration sleeve for Orion polarographic DO probes                      |
| <b>970802</b>    | Orion BOD funnel and stirrer for use with polarographic probes            |
| <b>080360</b>    | Orion BOD bottle adapter for use with polarographic probes                |

For accurate testing outside the lab, check out the Orion Star A portable meters on the following pages.

- pH
- ISE
- ORP
- Cond
- RDO
- DO
- Temp



## Thermo Scientific Orion VERSA STAR Advanced Electrochemistry Benchtop Meter & Modules

Don't see the benchtop meter parameter combination you need for your application? No problem – simply order the Orion VERSA STAR meter and choose the modules you need.

With versatility being the name of the game, you can also choose modules to add or change your existing Orion VERSA STAR meter to meet your latest testing needs. Simply swap out the modules when you need to and no need to wait to power down. The meter automatically recognizes the changes and datalogs remain unchanged and stored in the meter.

Each module includes the necessary probe connections for the measurement parameter. The meter includes two Orion Star stirrer probe ports, one RS232 port, two USB ports, power port and grounding port. Included with the meter are the benchtop electrode arm and individual channel covers to protect the channels not in use.

### Meter and Module Ordering Information

| Cat. No.         | Description   |
|------------------|---|
| <b>VSTAR00</b>   | <b>Orion VERSA STAR Benchtop Meter</b><br>- Electrode arm with redesigned holder<br>- Universal power adapter |
| <b>VSTAR-PH</b>  | Orion VERSA STAR pH/temperature module  |
| <b>VSTAR-ISE</b> | Orion VERSA STAR pH/ISE/temperature module  |
| <b>VSTAR-CND</b> | Orion VERSA STAR conductivity/temperature module  |
| <b>VSTAR-RD</b>  | Orion VERSA STAR RDO/DO/temperature module  |
| <b>VSTAR-LR</b>  | Orion VERSA STAR pH/temperature with LogR technology module   |
| <b>STARA-BEA</b> | Benchtop electrode arm  |
| <b>STARA-HB</b>  | Free-standing, weighted base for use with benchtop electrode arm (sold separately)                            |



No need to turn off your meter to switch modules – meter automatically recognizes module changes.

- pH
- ISE
- ORP
- Cond
- RDO
- DO
- Temp





## Thermo Scientific Orion Star A320, A220 and A120-Series Portable Meters

Outside the laboratory, testing brings enough of its own challenges from getting the sample to taking the reading. Just because you test outside the laboratory doesn't mean your testing accuracy or quality needs to suffer. The new Orion Star A series of portable meters features a variety of advantages to handle testing in difficult environments.



Protective plugs cover RS232 and USB ports to prevent corrosion

Bright, backlit LCD display clearly shows results on those bright, sunny days as well as the dark, rainy ones and in dark areas of the plant

IP-67 waterproof housing

Ergonomic design allows for one-handed operation and features a recessed groove in the back of the meter to fit fingers easily wrapping around the meter

Keypad texture works well with gloved and wet hands

Advanced meter design prevents water ingress through all connector ports.

Do you have access to an AC power source while testing?  
Save battery life by running the meter off AC power with the optional adapter





## Thermo Scientific Orion Star A329

pH/ISE/Conductivity/RDO/Dissolved Oxygen Portable Meter

The Thermo Scientific Orion Star A329 pH/ISE/Conductivity/RDO/Dissolved Oxygen Portable Meter is the top choice for advanced multiparameter measurements on location. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display can show each parameter with temperature individually or all three with temperature on one screen. Additional helpful icons include electrode status, time, date, sample ID, user ID and calibration points. Advanced features such as stability and averaging options provide additional options allowing for laboratory accuracy everywhere you need it.

### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Fix pH and ISE calibration errors without a complete recalibration with calibration editing
- No need to worry about DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- It's easy to get accurate DO results with automatic temperature, automatic/manual barometric pressure and automatic salinity compensation when used with simultaneously with conductivity
- Calibrate for DO using water-saturated air, air-saturated water, a Winkler titration or zero point calibration
- Selectable cell constant allows for use with 2- or 4-cell conductivity cells
- For advanced accuracy in conductivity readings, selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C with linear, non-linear, nLFu or USP/EP curve options
- Choice of practical salinity or natural sea water curves for salinity readings
- Linear or ISO/EN 27888 curves for TDS
- Whether you use ISE infrequently or have multiple samples every day – up to 5 point ISE calibration with advanced features such as timed end point, linear point-to-point, non-linear selectable auto-blank and low-concentration range stability
- Non-volatile memory holds up to 5000 data points with time and date stamp

- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- User and sample ID fields for additional data accuracy
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty

### Product Specifications

|                |                           | CE   TUV   FCC  |
|----------------|---------------------------|---|
| pH             | Range                     | -2.000 to 20.000  |
|                | Resolution                | 0.1, 0.01, 0.001  |
|                | Relative Accuracy         | ±0.002  |
|                | Calibration Points        | Up to 5   |
|                | Calibration Editing       | Yes   |
| mV/Rel mV/ ORP | Range                     | ±2000.0 mV  |
|                | Resolution                | 0.1   |
|                | Relative Accuracy         | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                | E <sub>s</sub> ORP Mode   | Yes   |
| ISE            | Range                     | 0 to 19999  |
|                | Resolution                | Up to 3 significant digits  |
|                | Relative Accuracy         | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                | Units                     | ppm, M, mg/L, %, ppb, none  |
|                | Calibration Points        | Up to 5   |
|                | Calibration Editing       | Yes   |
|                | Calibration Features      | Timed end point, linear point to point, non-linear selectable auto-blank, low concentration range stability |
| Conductivity   | Range                     | 0.001 µS to 3000 mS   |
|                | Resolution                | 0.001 µS minimum; 4 significant figures minimum   |
|                | Relative Accuracy         | 0.5 % reading ±1 digit  |
|                | Reference Temperature     | 5, 10, 15, 20, 25 °C (default)  |
|                | Temperature Compensation  | Linear (0 to 10.0 %/°C), nLn, nLFu, USP/EP  |
|                | Compatible Cell Constants | 0.001 to 199.9  |
|                | Calibration Points        | Up to 5 points  |
|                | Calibration Editing       | Yes   |
| Resistivity    | Range                     | 2 ohm to 100 meg-ohm  |
|                | Resolution                | 2 ohms-cm   |
|                | Relative Accuracy         | 0.5 % reading ±1 digit  |





Please turn the page...  
this is just the  
beginning of the  
portable meters.

**Product Specifications (Continued)**

| CE   TUV   FCC          |   |   |
|-------------------------|---|---|
| <b>Salinity</b>         | <b>Type</b>   | Practical salinity or natural sea water   |
|                         | <b>Range</b>  | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water  |
|                         | <b>Resolution</b>                                       | 0.01  |
|                         | <b>Relative Accuracy</b>                                | ±0.1  |
| <b>TDS</b>              | <b>Range</b>  | 1 to 200 ppt  |
|                         | <b>Resolution</b>                                       | 4 significant digits  |
|                         | <b>Relative Accuracy</b>                                | ±0.5 % reading ±1 digit   |
|                         | <b>TDS Factor Range</b>                                 | Linear 0.01 to 10.00, default 0.49  |
| <b>Dissolved Oxygen</b> | <b>Concentration - Polarographic</b>                    |   |
|                         | <b>Range</b>  | 0 to 90 mg/L  |
|                         | <b>Resolution</b>                                       | 0.01, 0.1   |
|                         | <b>Relative Accuracy</b>                                | ±0.2  |
|                         | <b>% Saturation - Polarographic</b>                     |   |
|                         | <b>Range</b>  | 0 to 600  |
|                         | <b>Resolution</b>                                       | 0.1, 1  |
|                         | <b>Relative Accuracy</b>                                | ±2 %  |
|                         | <b>Concentration - RDO</b>                              |   |
|                         | <b>Range</b>  | 0 to 50 mg/L  |
|                         | <b>Resolution</b>                                       | 0.01, 0.1   |
|                         | <b>Relative Accuracy</b>                                | ±0.1 mg/L up to 8 mg/L;<br>±0.2 mg/L from 8 to 20 mg/L;<br>10 % of reading from 20 to 50 mg/L |
|                         | <b>% Saturation - RDO</b>                               |   |
|                         | <b>Range</b>  | 0 to 500  |
|                         | <b>Resolution</b>                                       | 0.1, 1  |
|                         | <b>Relative Accuracy</b>                                | ±2 %  |
|                         | <b>Automatic Barometric Pressure Correction</b>         | 450.0 to 850.0 mm Hg  |
|                         | <b>Salinity Factor Correction</b>                       | Automatic with separate conductivity probe or manual; 0 to 45 ppt                             |
|                         | <b>Calibration Features</b>                             | Water-saturated air, air saturated water, manual (Winkler) and zero point                     |
|                         | <b>Probe Characteristics</b>                            | Polarographic or RDO  |
| <b>Temperature</b>      | <b>Range</b>  | -5 to 105 °C, 23 to 221 °F<br>(0 to 50 °C, 32 to 122 °F with RDO)                             |
|                         | <b>Resolution</b>                                       | 0.1   |
|                         | <b>Relative Accuracy</b>                                | ±0.1  |
|                         | <b>Offset Calibration</b>                               | 1 point   |
| <b>Datalogging</b>      | <b>Number of Datalogs</b>                               | 5000 with time and date stamp   |
|                         | <b>Log Function</b>                                     | Manual, ready (includes AUTO-READ™), timed  |
| <b>Inputs</b>           | <b>pH Electrode</b>                                     | BNC, reference pin  |
|                         | <b>Conductivity with Temperature Probe or ATC Probe</b> | 8-pin mini-DIN  |
|                         | <b>DO with Temperature Probe</b>                        | 9-pin mini-DIN  |
| <b>Output</b>           | RS232, USB  |   |
| <b>Power</b>            | <b>AC Adapter</b>                                       | Optional – universal, 100-240 VAC   |
|                         | <b>Battery Power</b>                                    | Included – 4 AAs  |
|                         | <b>Battery Life</b>                                     | 800 hrs   |

**Meter Ordering Information**

| Cat. No.         | Description   |
|------------------|---|
| <b>STARA3290</b> | <b>Orion Star A329 pH/ISE/Conductivity/Dissolved Oxygen Portable Multiparameter Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA3295</b> | <b>Orion Star A329 pH/ISE/Conductivity/Dissolved Oxygen Portable Multiparameter Meter Kit</b><br>- 8107UWMD Orion ROSS Triode 3-in-1 pH/ATC probe, 3m cable<br>- 013010MD Orion DuraProbe conductivity cell, 3m cable<br>- 087010MD Orion RDO optical/luminescence-based probe with 3m cable, stainless steel guard, calibration sleeve and optical/luminescence-based cap<br>- 910410 Orion pH 4.01 buffer, 10 pouches<br>- 910710 Orion pH 7.00 buffer, 10 pouches<br>- 911010 Orion pH 10.01 buffer, 10 pouches<br>- 810001 Orion ROSS electrode storage solution, 475 mL<br>- 01100710 Orion 1413 µS conductivity standard, 10 pouches<br>- 911110 rinse solution, 10 pouches<br>- Protective armor with probe holders<br>- Hard carrying case<br>- Four AA batteries (installed) |

**Accessories**

| Cat. No.          | Description  |
|-------------------|--|
| <b>STARA-CS</b>   | Hard carrying case for Orion Star A-series portable meters   |
| <b>1210005</b>    | Soft carrying case for Orion Star, Star Plus and Star A-series portable meters                               |
| <b>STARA-AR</b>   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| <b>STARA-ESPH</b> | pH electrode holder for Orion Star A-series armor  |
| <b>STARA-ESCD</b> | Conductivity and DO probe holder for Orion Star A-series armor   |
| <b>1010003</b>    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| <b>8107UWMD</b>   | Orion ROSS Triode 3-in-1 pH/ATC probe, gel-filled, 3m cable  |
| <b>910410</b>     | Orion pH 4.01 buffer pouches, 10/pk  |
| <b>910710</b>     | Orion pH 7.00 buffer pouches, 10/pk  |
| <b>911010</b>     | Orion pH 10.01 buffer pouches, 10/pk   |
| <b>911110</b>     | Orion pH rinse solution pouches, 10/pk   |
| <b>013010MD</b>   | Orion DuraProbe conductivity cell with 3m cable, 4-cell, K=0.475   |
| <b>013020MD</b>   | Orion DuraProbe conductivity cell with 6m cable, 4-cell, K=0.475   |
| <b>013025MD</b>   | Orion DuraProbe conductivity cell with 10m cable, 4-cell, K=0.475  |
| <b>011008</b>     | Orion conductivity standard, 100 µS/cm, 5 x 60 mL bottles  |
| <b>01100710</b>   | Orion conductivity standard pouches, 1413 µS/cm, 10/pk   |
| <b>01100610</b>   | Orion conductivity standard pouches, 12.9 mS/cm, 10/pk   |
| <b>1010001</b>    | Orion conductivity calibration resistor kit  |
| <b>087010MD</b>   | Orion RDO optical DO probe, 3m cable with stainless steel guard and calibration sleeve                       |
| <b>087020MD</b>   | Orion RDO optical DO probe, 6m cable with stainless steel guard and calibration sleeve                       |
| <b>087030MD</b>   | Orion RDO optical DO probe, 10m cable with stainless steel guard and calibration sleeve                      |
| <b>087050MD</b>   | Orion RDO optical DO probe, 15m cable with stainless steel guard and calibration sleeve                      |
| <b>087100MD</b>   | Orion RDO optical DO probe, 30m cable with stainless steel guard and calibration sleeve                      |
| <b>083005MD</b>   | Orion polarographic DO probe, 1.5m cable   |
| <b>080513</b>     | Orion polarographic DO probe maintenance kit   |
| <b>080514</b>     | Orion polarographic DO probe electrolyte solution, 60 mL   |
| <b>080017</b>     | Calibration sleeve for Orion polarographic DO probes   |
| <b>087003</b>     | Replacement calibration sleeve for Orion RDO optical probes  |
| <b>087001</b>     | Replacement optical cap for Orion RDO probes   |

- pH
- ISE
- ORP
- Cond
- RDO
- DO
- Temp



## Thermo Scientific Orion Star A324

pH/ISE Portable Meter

The Thermo Scientific Orion Star A324 pH/ISE Portable Meters is the top choice for advanced pH/ISE measurements on location. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows pH/mV/RmV and temperature along with electrode status, time, date, sample ID, user ID and calibration points. Advanced features such as stability and averaging options provide additional options allowing for laboratory accuracy everywhere you need it.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Whether you use ISE infrequently or have multiple samples every day – up to 5 point ISE calibration with advanced features such as timed end point, linear point-to-point, non-linear selectable auto-blank and low-concentration range stability
- Fix errors without a complete recalibration with the calibration editing function
- Non-volatile memory holds up to 5000 data points with time and date stamp
- User and sample ID fields for additional data accuracy
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty



## Product Specifications

| CE   TUV   FCC        |                               |   |
|-----------------------|-------------------------------|---|
| <b>pH</b>             | <b>Range</b>                  | -2.000 to 20.000  |
|                       | <b>Resolution</b>             | 0.1, 0.01, 0.001  |
|                       | <b>Relative Accuracy</b>      | ±0.002  |
|                       | <b>Calibration Points</b>     | Up to 5   |
|                       | <b>Calibration Editing</b>    | Yes   |
| <b>mV/Rel mV/ ORP</b> | <b>Range</b>                  | ±2000.0 mV  |
|                       | <b>Resolution</b>             | 0.1   |
|                       | <b>Relative Accuracy</b>      | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                       | <b>E<sub>r</sub> ORP Mode</b> | Yes   |
| <b>ISE</b>            | <b>Range</b>                  | 0 to 19999  |
|                       | <b>Resolution</b>             | Up to 3 significant digits  |
|                       | <b>Relative Accuracy</b>      | ±0.2 mV or ±0.05 % of reading whichever is greater  |
|                       | <b>Units</b>                  | ppm, M, mg/L, %, ppb, none  |
|                       | <b>Calibration Points</b>     | Up to 5   |
|                       | <b>Calibration Editing</b>    | Yes   |
|                       | <b>Calibration Features</b>   | Timed end point, linear point to point, non-linear selectable auto-blank, low concentration range stability |
| <b>Temperature</b>    | <b>Range</b>                  | -5 to 105 °C, 23 to 221 °F  |
|                       | <b>Resolution</b>             | 0.1   |
|                       | <b>Relative Accuracy</b>      | ±0.1  |
|                       | <b>Offset Calibration</b>     | 1 point   |
| <b>Datalogging</b>    | <b>Number of Datalogs</b>     | 5000 with time and date stamp   |
|                       | <b>Log Function</b>           | Manual, ready (include AUTO-READ™), timed   |
| <b>Inputs</b>         | <b>pH Electrode</b>           | BNC, reference pin  |
|                       | <b>ATC Probe</b>              | 8-pin mini-DIN  |
| <b>Output</b>         |                               | RS232, USB  |
| <b>Power</b>          | <b>AC Adapter</b>             | Optional – universal, 100-240 VAC   |
|                       | <b>Battery Power</b>          | Included – 4 AAs  |
|                       | <b>Battery Life</b>           | 800 hrs   |

## Meter Ordering Information

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA3240</b> | <b>Orion Star A324 pH/ISE Portable Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA3245</b> | <b>Orion Star A324 pH/ISE Portable Meter Kit</b><br>- 8107UWMMMD Orion ROSS Triode 3-in-1 pH/ATC Probe<br>- Orion pH 4, 7 and 10 buffers, 10 pouches of each value<br>- 810001 Orion ROSS electrode storage solution<br>- 911110 Rinse solution, 10 pouches<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

## Accessories

| Cat. No.          | Description  |
|-------------------|--|
| <b>STARA-CS</b>   | Hard carrying case for Orion Star A-series portable meters   |
| <b>1210005</b>    | Soft carrying case for Orion Star, Star Plus and Star A-series portable meters                               |
| <b>STARA-AR</b>   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| <b>STARA-ESPH</b> | pH electrode holder for Orion Star A-series armor  |
| <b>STARA-ESCD</b> | Conductivity and DO probe holder for Orion Star A-series armor   |
| <b>8107UWMMMD</b> | Orion ROSS Triode 3-in-1 pH/ATC probe, gel-filled, 3m cable  |
| <b>1010003</b>    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| <b>910410</b>     | Orion pH 4.01 buffer pouches, 10/pk  |
| <b>910710</b>     | Orion pH 7.00 buffer pouches, 10/pk  |
| <b>911010</b>     | Orion pH 10.01 buffer pouches, 10/pk   |
| <b>911110</b>     | Orion pH rinse solution pouches, 10/pk   |
| <b>9512HPBNWP</b> | Orion high-performance ammonia ISE   |
| <b>9512BNWP</b>   | Orion standard ammonia ISE   |
| <b>951007</b>     | Ammonia standard, 1000 ppm, 475 mL   |
| <b>951210</b>     | Low-level ammonia ISA  |
| <b>951211</b>     | Ammonia ISA, 475 mL  |
| <b>951209</b>     | Fill solution for Orion high-performance ammonia ISE, 60 mL  |
| <b>951202</b>     | Fill Solution for standard ammonia ISE, 60 mL  |
| <b>951213</b>     | Ammonia ISE storage solution   |
| <b>9609BNWP</b>   | Orion fluoride combination ISE   |
| <b>040906</b>     | Fluoride standard, 1 ppm with TISAB II, 475 mL   |
| <b>040907</b>     | Fluoride standard, 2 ppm with TISAB II, 475 mL   |
| <b>040908</b>     | Fluoride standard, 10 ppm with TISAB II, 475 mL  |
| <b>940909</b>     | TISAB II, 1 gallon   |
| <b>8611BNWP</b>   | Orion ROSS sodium combination ISE  |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A325 pH/Conductivity Portable Meter

The Thermo Scientific Orion Star A325 pH/Conductivity Portable Meter is the top choice for advanced pH and conductivity measurements on location. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows individual pH/mV/RmV or conductivity/TDS/salinity/resistivity results with temperature, or all results at once. Additional helpful information include electrode status, time, date, sample ID, user ID and calibration points. Advanced features such as stability and averaging options provide additional options allowing for laboratory accuracy everywhere you need it.

### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Fix pH calibration errors without a complete recalibration with calibration editing
- Selectable cell constant allows for use with 2- or 4-cell conductivity cells
- For advanced accuracy in conductivity readings, selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C with linear, non-linear, nLFu or USP/EP curve options
- Choice of practical salinity or natural sea water curves for salinity readings
- Linear or ISO/EN 27888 curves for TDS
- Non-volatile memory holds up to 5000 data points with time and date stamp
- User and sample ID fields for additional data accuracy
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty





## Product Specifications

| CE   TUV   FCC    |  |  |
|-------------------|--|--|
| pH                | Range  | -2.000 to 20.000                                   |
|                   | Resolution                                       | 0.1, 0.01, 0.001                                   |
|                   | Relative Accuracy                                | ±0.002   |
|                   | Calibration Points                               | Up to 5  |
|                   | Calibration Editing                              | Yes  |
| mV/Rel mV/<br>ORP | Range  | ±2000.0 mV   |
|                   | Resolution                                       | 0.1  |
|                   | Relative Accuracy                                | ±0.2 mV or ±0.05 % of reading whichever is greater |
|                   | E <sub>r</sub> ORP Mode                          | Yes  |
| Conductivity      | Range  | 0.001 µS to 3000 mS                                |
|                   | Resolution                                       | 0.001 µS minimum;<br>4 significant figures minimum |
|                   | Relative Accuracy                                | 0.5 % reading ±1 digit                             |
|                   | Reference Temperature                            | 5, 10, 15, 20, 25 °C (default)                     |
|                   | Temperature Compensation                         | Linear (0 to 10.0 %/°C), nLn, nLFu, USP/EP         |
|                   | Compatible Cell Constants                        | 0.001 to 199.9                                     |
|                   | Calibration Points                               | Up to 5 points                                     |
|                   | Calibration Editing                              | Yes  |
| Resistivity       | Range  | 2 ohm to 100 meg-ohm                               |
|                   | Resolution                                       | 2 ohms-cm  |
|                   | Relative Accuracy                                | 0.5 % reading ±1 digit                             |
| Salinity          | Type   | Practical salinity or natural sea water            |
|                   | Range  | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water       |
|                   | Resolution                                       | 0.01   |
| TDS               | Relative Accuracy                                | ±0.1   |
|                   | Range  | 0 to 200 ppt                                       |
|                   | Resolution                                       | 4 significant digits                               |
|                   | Relative Accuracy                                | ±0.5 % reading ±1 digit                            |
| Temperature       | TDS Factor Range                                 | Linear 0.01 to 10.00, default 0.49                 |
|                   | Range  | -5 to 105 °C, 23 to 221 °F                         |
|                   | Resolution                                       | 0.1  |
|                   | Relative Accuracy                                | ±0.1   |
| Datalogging       | Offset Calibration                               | 1 point  |
|                   | Number of Datalogs                               | 5000 with time and date stamp                      |
| Inputs            | Log Function                                     | Manual, ready (include AUTO-READ™), timed          |
|                   | pH Electrode                                     | BNC, reference pin                                 |
| Output            | Conductivity with Temperature Probe or ATC Probe | 8-pin mini-DIN                                     |
|                   | RS232, USB                                       |  |
| Power             | AC Adapter                                       | Optional – universal, 100-240 VAC                  |
|                   | Battery Power                                    | Included – 4 AAs                                   |
|                   | Battery Life                                     | 800 hrs  |

## Meter Ordering Information

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA3250</b> | <b>Orion Star A325 pH/Conductivity Portable Multiparameter Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA3255</b> | <b>Orion Star A325 pH/Conductivity Portable Multiparameter Meter Kit</b><br>- 8107UWMMMD Orion ROSS Triode 3-in-1 pH/ATC probe, 3m cable<br>- 013010MD Orion DuraProbe conductivity cell, 3m cable<br>- 910410 Orion pH 4.01 buffer, 10 pouches<br>- 910710 Orion pH 7.00 buffer, 10 pouches<br>- 911010 Orion pH 10.01 buffer, 10 pouches<br>- 810001 Orion ROSS electrode storage solution, 475 mL<br>- 01100710 Orion 1413 µS conductivity standard, 10 pouches<br>- 911110 rinse solution, 10 pouches<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

## Accessories

| Cat. No.          | Description  |
|-------------------|--|
| <b>STARA-CS</b>   | Hard carrying case for Orion Star A-series portable meters   |
| <b>STARA-AR</b>   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| <b>STARA-ESPH</b> | pH electrode holder for Orion Star A-series armor  |
| <b>STARA-ESCD</b> | Conductivity and DO probe holder for Orion Star A-series armor   |
| <b>8107UWMMMD</b> | Orion ROSS Triode 3-in-1 pH/ATC probe, gel-filled, 3m cable  |
| <b>013010MD</b>   | Orion DuraProbe conductivity cell with 3m cable, 4-cell, K=0.475   |
| <b>1010003</b>    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| <b>910410</b>     | Orion pH 4.01 buffer pouches, 10/pk  |
| <b>910710</b>     | Orion pH 7.00 buffer pouches, 10/pk  |
| <b>911010</b>     | Orion pH 10.01 buffer pouches, 10/pk   |
| <b>911110</b>     | Orion pH rinse solution pouches, 10/pk   |
| <b>011008</b>     | Orion conductivity standard, 100 µS/cm, 5 x 60 mL bottles  |
| <b>01100710</b>   | Orion conductivity standard pouches, 1413 µS/cm, 10/pk   |
| <b>01100610</b>   | Orion conductivity standard pouches, 12.9 mS/cm, 10/pk   |
| <b>1010001</b>    | Orion conductivity calibration resistor kit  |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A326 pH/RDO/Dissolved Oxygen Portable Meter

The Thermo Scientific Orion Star A326 pH/RDO/Dissolved Oxygen Portable Meter is the top choice for advanced pH and dissolved oxygen measurements on location. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows individual pH/mV/RmV or dissolved oxygen in percent saturation or concentration results with temperature, or all results at once. Additional helpful information include electrode status, time, date, sample ID, user ID and calibration points. Advanced features such as stability and averaging options provide additional options allowing for laboratory accuracy everywhere you need it.



### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Fix pH calibration errors without a complete recalibration with calibration editing
- No need to worry about DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- Easily get accurate DO results with automatic temperature, manual salinity and automatic/manual barometric pressure correction
- Calibrate DO using water-saturated air, air-saturated water, a Winkler titration or zero point calibration
- Non-volatile memory holds up to 5000 data points with time and date stamp
- User and sample ID fields for additional data accuracy
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use on AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty





### Product Specifications

| CE   TUV   FCC     |                                       |   |                          |
|--------------------|---------------------------------------|---|--------------------------|
| pH                 | Range                                 | -2.000 to 20.000  |                          |
|                    | Resolution                            | 0.1, 0.01, 0.001  |                          |
|                    | Relative Accuracy                     | ±0.002  |                          |
|                    | Calibration Points                    | Up to 5   |                          |
|                    | Calibration Editing                   | Yes   |                          |
| mV/Rel mV/<br>ORP  | Range                                 | ±2000.0 mV  |                          |
|                    | Resolution                            | 0.1   |                          |
|                    | Relative Accuracy                     | ±0.2 mV or ±0.05 % of reading whichever is greater  |                          |
|                    | E <sub>o</sub> ORP Mode               | Yes   |                          |
| Dissolved Oxygen   | <b>Concentration - Polarographic</b>  |   |                          |
|                    | Range                                 | 0 to 90 mg/L  |                          |
|                    | Resolution                            | 0.01, 0.1   |                          |
|                    | Relative Accuracy                     | ±0.2  |                          |
|                    | <b>% Saturation - Polarographic</b>   |   |                          |
|                    | Range                                 | 0 to 600  |                          |
|                    | Resolution                            | 0.1, 1  |                          |
|                    | Relative Accuracy                     | ±2 %  |                          |
|                    | <b>Concentration - RDO</b>            |   |                          |
|                    | Range                                 | 0 to 50 mg/L  |                          |
|                    | Resolution                            | 0.01, 0.1   |                          |
|                    | Relative Accuracy                     | ±0.1 mg/L up to 8 mg/L;<br>±0.2 mg/L from 8 to 20 mg/L;<br>10 % of reading from 20 to 50 mg/L |                          |
|                    | <b>% Saturation - RDO</b>             |   |                          |
|                    | Range                                 | 0 to 500  |                          |
|                    | Resolution                            | 0.1, 1  |                          |
|                    | Relative Accuracy                     | ±2 %  |                          |
|                    | Manual Barometric Pressure Correction | 450.0 to 850.0 mm Hg  |                          |
|                    | Manual Salinity Factor Correction     | 0 to 45 ppt   |                          |
|                    | Calibration Features                  | Water-saturated air, air saturated water, manual (Winkler) and zero point                     |                          |
|                    | Probe Characteristics                 | Polarographic or RDO  |                          |
|                    | Temperature                           | Range   | 0 to 50 °C, 32 to 122 °F |
|                    |                                       | Resolution  | 0.1                      |
| Relative Accuracy  |                                       | ±0.1  |                          |
| Offset Calibration |                                       | 1 point   |                          |
| Datalogging        | Number of Datalogs                    | 5000 with time and date stamp   |                          |
|                    | Log Function                          | Manual, ready (includes AUTO-READ™), timed  |                          |
| Inputs             | pH Electrode                          | BNC, reference pin  |                          |
|                    | DO with Temp. Probe                   | 9-pin mini-DIN  |                          |
| Output             |                                       | RS232, USB  |                          |
| Power              | AC Adapter                            | Optional – universal, 100-240 VAC   |                          |
|                    | Battery Power                         | Optional – 4 AAs  |                          |
|                    | Battery Life                          | 800 hrs   |                          |

### Meter Ordering Information

| Cat. No.  | Description  |
|-----------|--|
| STARA3260 | <b>Orion Star A326 pH/RDO/Dissolved Oxygen Portable Multiparameter Meter</b><br>- Four AA batteries (installed)  |
| STARA3265 | <b>Orion Star A326 pH/RDO/Dissolved Oxygen Portable Multiparameter Meter Kit</b><br>- 8107UWMMD Orion ROSS Triode 3-in-1 pH/ATC probe, 3m cable<br>- 087010MD Orion RDO optical/luminescence-based probe with 3m cable, stainless steel guard, calibration sleeve and optical/luminescence-based cap<br>- 910410 Orion pH 4.01 buffer, 10 pouches<br>- 910710 Orion pH 7.00 buffer, 10 pouches<br>- 911010 Orion pH 10.01 buffer, 10 pouches<br>- 810001 Orion ROSS electrode storage solution, 475 mL<br>- 01100710 Orion 1413 µS conductivity standard, 10 pouches<br>- 911110 rinse solution, 10 pouches<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

### Accessories

| Cat. No.   | Description  |
|------------|--|
| STARA-CS   | Hard carrying case for Orion Star A-series portable meters   |
| STARA-AR   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| STARA-ESPH | pH electrode holder for Orion Star A-series armor  |
| STARA-ESCD | Conductivity and DO probe holder for Orion Star A-series armor   |
| 8107UWMMD  | Orion ROSS Triode 3-in-1 pH/ATC probe, gel-filled, 3m cable  |
| 087020MD   | Orion RDO optical DO probe, 6m cable with stainless steel guard and calibration sleeve                       |
| 087030MD   | Orion RDO optical DO probe, 10m cable with stainless steel guard and calibration sleeve                      |
| 087050MD   | Orion RDO optical DO probe, 15m cable with stainless steel guard and calibration sleeve                      |
| 087100MD   | Orion RDO optical DO probe, 30m cable with stainless steel guard and calibration sleeve                      |
| 1010003    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| 910410     | Orion pH 4.01 buffer pouches, 10/pk  |
| 910710     | Orion pH 7.00 buffer pouches, 10/pk  |
| 911010     | Orion pH 10.01 buffer pouches, 10/pk   |
| 911110     | Orion pH rinse solution pouches, 10/pk   |
| 087010MD   | Orion RDO optical DO probe, 3m cable with stainless steel guard and calibration sleeve                       |
| 083005MD   | Orion polarographic DO probe, 1.5m cable   |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A321 & Star A221 pH Portable Meters

### Orion Star A321

The Thermo Scientific Orion Star A321 pH Portable Meter is the top choice for advanced pH measurements on location. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows pH/mV/RmV and temperature along with electrode status, time, date, sample ID, user ID and calibration points. Advanced features such as stability and averaging options provide additional options allowing for laboratory accuracy everywhere you need it.

### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Fix errors without a complete recalibration with calibration editing
- Non-volatile memory holds up to 5000 data points with time and date stamp
- User and sample ID fields for additional data accuracy
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty



### Orion Star A221

Get the readings that you need where you need them with the Thermo Scientific Orion Star A221 pH Portable Meter. The large, backlit graphic LCD display shows pH/mV/RmV and temperature along with electrode status, time, date and calibration points.

### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Up to 5 point pH calibration with automatic recognition for USA/NIST and DIN buffers
- Non-volatile memory holds up to 1000 data points with time and date stamp
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty



**Product Specifications (Orion Star A321 & Star A221)**

| CE   TUV   FCC            |                               |   |
|---------------------------|-------------------------------|---|
| <b>pH</b>                 | <b>Range</b>                  | -2.000 to 20.000  |
|                           | <b>Resolution</b>             | 0.1, 0.01, 0.001  |
|                           | <b>Relative Accuracy</b>      | ±0.002  |
|                           | <b>Calibration Points</b>     | Up to 5   |
|                           | <b>Calibration Editing</b>    | Orion Star A321: Yes<br>Orion Star A221: No   |
| <b>mV/Rel mV/<br/>ORP</b> | <b>Range</b>                  | ±2000.0 mV  |
|                           | <b>Resolution</b>             | 0.1   |
|                           | <b>Relative Accuracy</b>      | ±0.2 mV or ±0.05 % of reading<br>whichever is greater   |
|                           | <b>E<sub>r</sub> ORP Mode</b> | Yes   |
| <b>Temperature</b>        | <b>Range</b>                  | -5 to 105 °C, 23 to 221 °F  |
|                           | <b>Resolution</b>             | 0.1   |
|                           | <b>Relative Accuracy</b>      | ±0.1  |
|                           | <b>Offset Calibration</b>     | 1 point   |
| <b>Datalogging</b>        | <b>Number of Datalogs</b>     | Orion Star A321:<br>5000 with time and date stamp<br>Orion Star A221:<br>1000 with time and date stamp                  |
|                           | <b>Log Function</b>           | Orion Star A321:<br>Manual, ready (includes AUTO-READ™), timed<br>Orion Star A221:<br>Manual, Automatic with AUTO-READ™ |
| <b>Inputs</b>             | <b>pH Electrode</b>           | BNC, reference pin  |
|                           | <b>ATC Probe</b>              | 8-pin mini-DIN  |
| <b>Output</b>             |                               | RS232, USB  |
| <b>Power</b>              | <b>AC Adapter</b>             | Optional – universal, 100-240 VAC   |
|                           | <b>Battery Power</b>          | Included – 4 AAs  |
|                           | <b>Battery Life</b>           | 800 hrs   |

**Meter Ordering Information**

| Cat. No.         | Description   |
|------------------|---|
| <b>STARA3210</b> | <b>Orion Star A321 pH Portable Meter</b><br>- Four AA batteries (installed)   |
| <b>STARA3215</b> | <b>Orion Star A321 pH Portable Meter Kit</b><br>- 8107UWMMD Orion ROSS Triode 3-in-1 pH/ATC probe<br>- 910410 Orion pH 4.01 buffer, 10 pouches<br>- 910710 Orion pH 7.00 buffer, 10 pouches<br>- 911010 Orion pH 10.01 buffer, 10 pouches<br>- 810001 Orion ROSS electrode storage solution, 475 mL<br>- 911110 rinse solution, 10 pouches<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |
| <b>STARA2210</b> | <b>Orion Star A221 pH Portable Meter</b><br>- Four AA batteries (installed)   |
| <b>STARA2215</b> | <b>Orion Star A221 pH Portable Meter Kit</b><br>- 8107UWMMD Orion ROSS Triode 3-in-1 pH/ATC probe<br>- 910410 Orion pH 4.01 buffer, 10 pouches<br>- 910710 Orion pH 7.00 buffer, 10 pouches<br>- 911010 Orion pH 10.01 buffer, 10 pouches<br>- 810001 Orion ROSS electrode storage solution, 475 mL<br>- 911110 rinse solution, 10 pouches<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

**Accessories**

| Cat. No.          | Description  |
|-------------------|--|
| <b>STARA-CS</b>   | Hard carrying case for Orion Star A-series portable meters   |
| <b>STARA-AR</b>   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| <b>STARA-ESPH</b> | pH electrode holder for Orion Star A-series armor  |
| <b>STARA-ESCD</b> | Conductivity and DO probe holder for Orion Star A-series armor   |
| <b>8107UWMMD</b>  | Orion ROSS Triode 3-in-1 pH/ATC probe, gel-filled, 3m cable  |
| <b>1010003</b>    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| <b>910410</b>     | Orion pH 4.01 buffer pouches, 10/pk  |
| <b>910710</b>     | Orion pH 7.00 buffer pouches, 10/pk  |
| <b>911010</b>     | Orion pH 10.01 buffer pouches, 10/pk   |
| <b>911110</b>     | Orion pH rinse solution pouches, 10/pk   |

We told you we've expanded the line. The new Orion Star A series line still has more options on the following pages.

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A121 pH Portable Meter

Thermo Scientific Orion Star A121 pH Portable Meters combine simplicity with accuracy. A large LCD displays pH or mV readings along with temperature. Icons provide quick updates on battery life, electrode status and calibration information. Simple button layout and onscreen messages help with calibration and setup menu choices.



### Features and Benefits

- Large, informative screen clearly shows the main information, including pH or mV reading, temperature in °C or °F, meter mode, calibration information and battery life
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Up to 3 point pH calibration
- Automatic recognition of USA/NIST and DIN buffers
- Easily recall calibration slope data for procedure checks
- Non-volatile memory holds up to 50 data points
- Four AA batteries (included) provide over 2000 hours of operation or purchase the universal power adapter (sold separately) to run meter on AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty



### Product Specifications

| CE   TUV   FCC |                                |  |
|----------------|--------------------------------|--|
| pH             | Range                          | -2.00 to 16.00                                     |
|                | Resolution                     | 0.1, 0.01  |
|                | Relative Accuracy              | ±0.01  |
|                | pH Calibration Points          | Up to 3  |
| mV/Rel mV/ ORP | Range - mV                     | ±1600.0 mV   |
|                | Range - RmV                    | ±1999.9 mV   |
|                | Resolution                     | 0.1  |
|                | Relative Accuracy              | ±0.2 mV or ±0.05 % of reading whichever is greater |
|                | E <sub>s</sub> ORP Mode        | No   |
| Temperature    | Range                          | -5 to 105 °C, 23 to 221 °F                         |
|                | Resolution                     | 0.1  |
|                | Relative Accuracy              | ±0.1   |
|                | Temperature Compensation       | Automatic or manual                                |
|                | Temperature Offset Calibration | Yes  |
| Datalogging    | Number of Datalogs             | 50   |
|                | Log Function                   | Manual, Automatic with AUTO-READ™                  |
| Inputs         | pH Electrode                   | BNC  |
|                | ATC Probe                      | 8-pin mini-DIN                                     |
| Power          | AC Adapter                     | Optional – universal, 100-240 VAC                  |
|                | Battery Power                  | Included – 4 AAs                                   |
|                | Battery Life                   | 2000 hrs   |

### Meter Ordering Information

| Cat. No.  | Description  |
|-----------|--|
| STARA1210 | <b>Orion Star A121 pH Portable Meter</b><br>- Four AA batteries (installed)  |
| STARA1215 | <b>Orion Star A121 pH Portable Meter Kit</b><br>- 9107BNMD Orion Triode 3-in-1 pH/ATC probe<br>- Solution kit (60 mL each of pH 4, 7 and 10 buffers; storage solution and cleaning solution)<br>- 911110 rinse solution, 10 pouches<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

### Accessories

| Cat. No.   | Description  |
|------------|--|
| STARA-CS   | Hard carrying case for Orion Star A-series portable meters   |
| STARA-AR   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes     |
| STARA-ESPH | pH electrode holder for Orion Star A-series armor  |
| STARA-ESCD | Conductivity and DO probe holder for Orion Star A-series armor   |
| 9157BNMD   | Orion Triode 3-in-1 pH/ATC probe, refillable, epoxy body   |
| 9107BNMD   | Orion Triode 3-in-1 pH/ATC probe, gel-filled, epoxy body   |
| 1010003    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| 910410     | Orion pH 4.01 buffer pouches, 10/pk  |
| 910710     | Orion pH 7.00 buffer pouches, 10/pk  |
| 911010     | Orion pH 10.01 buffer pouches, 10/pk   |
| 911110     | Orion pH rinse solution pouches, 10/pk   |
| 916099     | Orion pH buffer assortment pack - 60 mL each of pH 4, 7 and 10 buffers; storage solution and cleaning solution D |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A322 & Star A222

### Conductivity Portable Meters

#### Orion Star A322

The Thermo Scientific Orion Star A322 Conductivity Portable Meter is the top choice for advanced measurements on location. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows conductivity/TDS/salinity resistivity and temperature along with electrode status, time, date, sample ID, user ID and calibration points. Advanced features such as stability and averaging options provide additional options allowing for laboratory accuracy everywhere you need it.

#### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Selectable cell constant allows for use with 2- or 4-cell conductivity cells
- For advanced accuracy, selectable reading reference temperatures of 5, 10, 15, 20 or 25 °C with linear, non-linear, nLFu or USP/EP curve options
- Choice of practical salinity or natural sea water curves for salinity readings
- Linear or ISO/EN 27888 curves for TDS
- Non-volatile memory holds up to 5000 data points with time and date stamp
- User and sample ID fields for additional data accuracy
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty

#### Orion Star A222

Get the readings that you need where you need them with the Thermo Scientific Orion Star A222 Conductivity Portable Meter. The large, backlit graphic LCD display shows conductivity/TDS/salinity/resistivity and temperature along with electrode status, time, date and calibration points.

#### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Selectable cell constant allows for use with 2- or 4-cell conductivity cells
- Selectable reading reference temperatures of 15, 20 or 25 °C with linear or non-linear curve options
- Includes the standard practical salinity curve for salinity readings
- Linear or ISO/EN 27888 curves for TDS
- Non-volatile memory holds up to 1000 data points with time and date stamp
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty





**Product Specifications (Orion Star A322 & Star A222)**

| CE   TUV   FCC      |  |   |
|---------------------|--|---|
| <b>Conductivity</b> | <b>Range</b>                               | 0.001 µS to 3000 mS   |
|                     | <b>Resolution</b>                          | 0.001 µS minimum;<br>4 significant figures minimum  |
|                     | <b>Relative Accuracy</b>                   | 0.5 % reading ±1 digit  |
|                     | <b>Reference Temperature</b>               | Orion Star A322: 5, 10, 15, 20, 25 °C<br>Orion Star A222: 15, 20, 25 °C   |
|                     | <b>Temperature Compensation</b>            | Orion Star A322:<br>Linear (0 to 10.0 %/°C), nLn, nLFu, USP/EP<br>Orion Star A222:<br>Linear (0 to 10.0 %/°C), nLn      |
|                     | <b>Compatible Cell Constants</b>           | 0.001 to 199.9  |
|                     | <b>Calibration Points</b>                  | Up to 5 points  |
|                     | <b>Calibration Editing</b>                 | Orion Star A322: Yes<br>Orion Star A222: –  |
| <b>Resistivity</b>  | <b>Range</b>                               | 2 ohm to 100 meg-ohm  |
|                     | <b>Resolution</b>                          | 2 ohms-cm   |
|                     | <b>Relative Accuracy</b>                   | 0.5 % reading ±1 digit  |
| <b>Salinity</b>     | <b>Type</b>                                | Orion Star A322:<br>Practical salinity or natural sea water<br>Orion Star A222:<br>Practical salinity                   |
|                     | <b>Range</b>                               | 0.01 to 80.0 psu<br>0.01 to 42 ppt sea water  |
|                     | <b>Resolution</b>                          | 0.01  |
|                     | <b>Relative Accuracy</b>                   | ±0.1  |
| <b>TDS</b>          | <b>Range</b>                               | 0 to 200 ppt  |
|                     | <b>Resolution</b>                          | 4 significant digits  |
|                     | <b>Relative Accuracy</b>                   | ±0.5 % reading ±1 digit   |
|                     | <b>TDS Factor Range</b>                    | Linear, 0.01 to 10.00   |
| <b>Temperature</b>  | <b>Range</b>                               | -5 to 105 °C, 23 to 221 °F  |
|                     | <b>Resolution</b>                          | 0.1   |
|                     | <b>Relative Accuracy</b>                   | ±0.1  |
|                     | <b>Offset Calibration</b>                  | 1 point   |
| <b>Datalogging</b>  | <b>Number of Datalogs</b>                  | Orion Star A322:<br>5000 with time and date stamp<br>Orion Star A222:<br>1000 with time and date stamp                  |
|                     | <b>Log Function</b>                        | Orion Star A322:<br>Manual, ready (includes AUTO-READ™), timed<br>Orion Star A222:<br>Manual, Automatic with AUTO-READ™ |
| <b>Inputs</b>       | <b>Conductivity with Temperature Probe</b> | 8-pin mini-DIN  |
| <b>Output</b>       |  | RS232, USB  |
| <b>Power</b>        | <b>AC Adapter</b>                          | Optional – universal, 100-240 VAC   |
|                     | <b>Battery Power</b>                       | Included – 4 AAs  |
|                     | <b>Battery Life</b>                        | 800 hrs   |

**Meter Ordering Information**

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA3220</b> | <b>Orion Star A322 Conductivity Portable Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA3225</b> | <b>Orion Star A322 Conductivity Portable Meter Kit</b><br>- 013010MD Orion DuraProbe conductivity cell with 3m cable, K=0.475<br>- 01100710 conductivity standard pouches, 1413 µS, pack of 10<br>- 911110 rinse solution, pack of 10<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |
| <b>STARA2220</b> | <b>Orion Star A222 Conductivity Portable Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA2225</b> | <b>Orion Star A222 Conductivity Portable Meter Kit</b><br>- 013010MD Orion DuraProbe conductivity cell with 3m cable, K=0.475<br>- 01100710 conductivity standard pouches, 1413 µS, pack of 10<br>- 911110 rinse solution, pack of 10<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

**Accessories**

| Cat. No.          | Description  |
|-------------------|--|
| <b>STARA-CS</b>   | Hard carrying case for Orion Star A-series portable meters   |
| <b>1210005</b>    | Soft carrying case for Orion Star, Star Plus and Star A-series portable meters                               |
| <b>STARA-AR</b>   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| <b>STARA-ESCD</b> | Conductivity and DO probe holder for Orion Star A-series armor   |
| <b>STARA-ESPH</b> | pH electrode holder for Orion Star A-series armor  |
| <b>013005MD</b>   | Orion DuraProbe conductivity cell with 1.5m cable, 4-cell, K=0.475   |
| <b>013010MD</b>   | Orion DuraProbe conductivity cell with 3m cable, 4-cell, K=0.475   |
| <b>013020MD</b>   | Orion DuraProbe conductivity cell with 6m cable, 4-cell, K=0.475   |
| <b>013025MD</b>   | Orion DuraProbe conductivity cell with 10m cable, 4-cell, K=0.475  |
| <b>1010003</b>    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| <b>011008</b>     | Orion conductivity standard, 100 µS/cm, 5 x 60 mL bottles  |
| <b>01100710</b>   | Orion conductivity standard pouches, 1413 µS/cm, 10/pk   |
| <b>01100610</b>   | Orion conductivity standard pouches, 12.9 mS/cm, 10/pk   |
| <b>911110</b>     | Orion rinse solution pouches, 10/pk  |
| <b>1010001</b>    | Orion conductivity calibration resistor kit  |

That's not all. We have more new meters on the following pages.

- pH
- ISE
- ORP
- Cond
- RDO
- DO
- Temp



## Thermo Scientific Orion Star A122 Conductivity Portable Meter

Thermo Scientific Orion Star A122 Conductivity Portable Meters combine simplicity with accuracy. A large LCD displays conductivity or TDS readings along with temperature. Icons provide quick updates on battery life and completed calibration status. Simple button layout and onscreen messages help with calibration and setup menu choices.

### Features and Benefits

- Large, informative screen clearly shows the main information, including conductivity or TDS reading, temperature in °C or °F, meter mode and battery life
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Selectable cell constant
- Manual calibration or automatic calibration when using a Thermo Scientific Orion conductivity standard (sold separately)
- Selectable reading reference temperatures of 20 °C or 25 °C for an accurate result
- Non-volatile memory holds up to 50 data points
- Four AA batteries (included) provide over 2000 hours of operation or purchase the universal power adapter (sold separately) to run meter on AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty







### Product Specifications

| CE   TUV   FCC      |                                  |  |
|---------------------|----------------------------------|--|
| <b>Conductivity</b> | <b>Range</b>                     | 0.1 $\mu$ S/cm to 200 mS/cm                            |
|                     | <b>Resolution</b>                | 0.01 $\mu$ S minimum;<br>3 significant figures minimum |
|                     | <b>Relative Accuracy</b>         | 0.5 % reading $\pm$ 1 digit                            |
|                     | <b>Reference Temperature</b>     | 20, 25 $^{\circ}$ C (default)                          |
|                     | <b>Temperature Compensation</b>  | Linear (0.0 to 10.0 %/ $^{\circ}$ C)                   |
|                     | <b>Compatible Cell Constants</b> | 0.001 to 10  |
|                     | <b>Calibration Points</b>        | 1  |
| <b>TDS</b>          | <b>Range</b>                     | 1 to 19,999 mg/L                                       |
|                     | <b>Resolution</b>                | 4 significant digits                                   |
|                     | <b>Relative Accuracy</b>         | 0.5 % reading $\pm$ 1 digit                            |
|                     | <b>TDS Factor Range</b>          | Linear, 0.01 to 10.00, default 0.49                    |
| <b>Temperature</b>  | <b>Range</b>                     | -5 to 105 $^{\circ}$ C, 23 to 221 $^{\circ}$ F         |
|                     | <b>Resolution</b>                | 0.1  |
|                     | <b>Relative Accuracy</b>         | $\pm$ 0.1  |
|                     | <b>Offset Calibration</b>        | Yes  |
| <b>Datalogging</b>  | <b>Number of Datalogs</b>        | 50   |
|                     | <b>Log Function</b>              | Manual, Automatic with AUTO-READ™                      |
| <b>Inputs</b>       | <b>Conductivity</b>              | 8-pin mini-DIN   |
| <b>Power</b>        | <b>AC Adapter</b>                | Optional – universal, 100-240 VAC                      |
|                     | <b>Battery Power</b>             | Included – 4 AAs                                       |
|                     | <b>Battery Life</b>              | 2000 hrs   |

### Meter Ordering Information

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA1220</b> | <b>Orion Star A122 Conductivity Portable Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA1225</b> | <b>Orion Star A122 Conductivity Portable Meter Kit</b><br>- 011050MD Orion conductivity cell, K=1.0<br>- 011007 conductivity standard, 1413 $\mu$ S, 5 x 60 mL<br>- 911110 rinse solution, 10 pouches<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

### Accessories

| Cat. No.          | Description  |
|-------------------|--|
| <b>STARA-CS</b>   | Hard carrying case for Orion Star A-series portable meters   |
| <b>STARA-AR</b>   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| <b>STARA-ESCD</b> | Conductivity and DO probe holder for Orion Star A-series armor   |
| <b>STARA-ESPH</b> | pH electrode holder for Orion Star A-series armor  |
| <b>011050MD</b>   | Orion 2-electrode conductivity cell, K=1.0   |
| <b>1010003</b>    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| <b>011008</b>     | Orion conductivity standard, 100 $\mu$ S/cm, 5 x 60 mL bottles   |
| <b>01100710</b>   | Orion conductivity standard pouches, 1413 $\mu$ S/cm, 10/pk  |
| <b>01100610</b>   | Orion conductivity standard pouches, 12.9 mS/cm, 10/pk   |
| <b>911110</b>     | Rinse solution, 10/pk  |
| <b>1010001</b>    | Orion conductivity calibration resistor kit  |

- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A323 & Star A223

### RDO/Dissolved Oxygen Portable Meters

#### Orion Star A323

The Thermo Scientific Orion Star A323 RDO/Dissolved Oxygen Portable Meter is the top choice for ensuring proper oxygen levels for maximum process control on location. Get the information you need quickly and easily from the large, backlit graphic LCD display. Informative display shows dissolved oxygen in percent saturation or concentration with temperature and electrode status, time, date, sample ID, user ID and calibration points. Advanced features such as stability and averaging options provide additional options allowing for laboratory accuracy everywhere you need it.

#### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- No need to worry about DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- Accurate results are easy with automatic temperature, manual salinity and automatic/manual barometric pressure compensation
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen, ready indicator alerts when readings are stable and timed reading gathers data in specific time intervals
- Calibrate using water-saturated air, air-saturated water, a Winkler titration or zero point calibration
- Non-volatile memory holds up to 5000 data points with time and date stamp
- User and sample ID fields for additional data accuracy
- Stores up to 10 methods allow for customized procedures to differentiate between tests and/or users
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty



#### Orion Star A223

Get the readings that you need where you need them with the Thermo Scientific Orion Star A223 RDO/Dissolved Oxygen Portable Meter. The large, backlit graphic LCD display shows dissolved oxygen in percent saturation or concentration with temperature and electrode status, time, date and calibration points.

#### Features and Benefits

- Anyone can use this meter with its plain language screen prompts, soft keys that update for easy selection and a multilanguage interface that supports English, Spanish, French, Italian, German and Chinese
- No need to worry about DO probe compatibility – the meter accepts and automatically recognizes Orion polarographic and RDO optical/luminescence-based probes
- Accurate results are easy with automatic temperature, manual salinity and automatic/manual barometric pressure compensation
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Calibrate using water-saturated air, air-saturated water, a Winkler titration or zero point calibration
- Non-volatile memory holds up to 1000 data points with time and date stamp
- Easily transfer data and keep meter software up-to-date with the USB and RS232 ports and complimentary data analysis software
- Four AA batteries (included) provide over 800 hours of operation or purchase the universal power adapter (sold separately) to use AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty



**Product Specifications (Orion Star A323 & Star A223)**

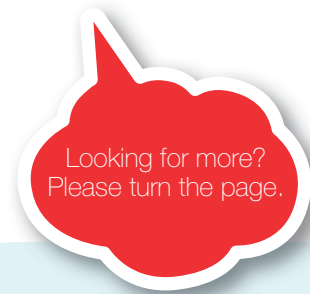
| CE   TUV   FCC                               |   |   |
|--|---|---|
| <b>Dissolved Oxygen</b>                      | <b>Concentration - Polarographic</b>                                      |   |
|  | <b>Range</b>  | 0 to 90 mg/L  |
|  | <b>Resolution</b>   | 0.01, 0.1   |
|  | <b>Relative Accuracy</b>  | ±0.2  |
|  | <b>% Saturation - Polarographic</b>                                       |   |
|  | <b>Range</b>  | 0 to 600  |
|  | <b>Resolution</b>   | 0.1, 1  |
|  | <b>Relative Accuracy</b>  | ±2 %  |
|  | <b>Concentration - RDO</b>  |   |
|  | <b>Range</b>  | 0 to 50 mg/L  |
|  | <b>Resolution</b>   | 0.01, 0.1   |
|  | <b>Relative Accuracy</b>  | ±0.1 mg/L up to 8 mg/L;<br>±0.2 mg/L from 8 to 20 mg/L;<br>10 % of reading from 20 to 50 mg/L                             |
|  | <b>% Saturation - RDO</b>   |   |
|  | <b>Range</b>  | 0 to 500  |
| <b>Resolution</b>                            | 0.1, 1  |   |
| <b>Relative Accuracy</b>                     | ±2 %  |   |
| <b>Manual Barometric Pressure Correction</b> | 450.0 to 850.0 mm Hg  |   |
| <b>Manual Salinity Factor Correction</b>     | 0 to 45 ppt   |   |
| <b>Calibration Features</b>                  | Water saturated air, air saturated water, manual (Winkler) and zero point |   |
| <b>Probe Characteristics</b>                 | Polarographic or RDO  |   |
| <b>Temperature</b>                           | <b>Range</b>  | 0 to 50 °C, 32 to 122 °F  |
|  | <b>Resolution</b>   | 0.1   |
|  | <b>Relative Accuracy</b>  | ±0.1  |
|  | <b>Offset Calibration</b>   | 1 point   |
| <b>Datalogging</b>                           | <b>Number of Datalogs</b>   | Orion Star A323:<br>5000 with time and date stamp<br>Orion Star A223:<br>1000 with time and date stamp                    |
|  | <b>Log Function</b>   | Orion Star A323:<br>Manual, automatic (with Auto-Read™), timed<br>Orion Star A223:<br>Manual, automatic (with Auto-Read™) |
| <b>Inputs</b>                                | <b>DO with Temperature Probe</b>  | 9-pin mini-DIN  |
| <b>Output</b>                                |   | RS232, USB  |
| <b>Power</b>                                 | <b>Power Cord</b>   | Optional – universal, 100-240 VAC   |
|  | <b>Battery Power</b>  | Included – 4 AAs  |
|  | <b>Battery Life</b>   | 800 hrs   |

**Meter Ordering Information**

| Cat. No.         | Description  |
|------------------|--|
| <b>STARA3230</b> | <b>Orion Star A323 Dissolved Oxygen Portable Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA3235</b> | <b>Orion Star A323 Dissolved Oxygen Portable Meter Kit</b><br>- 087010MD Orion RDO optical/luminescence-based probe with 3m cable, stainless steel guard, calibration sleeve and optical/luminescence-based cap<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed)     |
| <b>STARA2230</b> | <b>Orion Star A223 RDO/Dissolved Oxygen Portable Meter</b><br>- Four AA batteries (installed)  |
| <b>STARA2235</b> | <b>Orion Star A223 RDO/Dissolved Oxygen Portable Meter Kit</b><br>- 087010MD Orion RDO optical/luminescence-based probe with 3m cable, stainless steel guard, calibration sleeve and optical/luminescence-based cap<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

**Accessories**

| Cat. No.          | Description  |
|-------------------|--|
| <b>STARA-CS</b>   | Hard carrying case for Orion Star A-series portable meters   |
| <b>STARA-AR</b>   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| <b>STARA-ESCD</b> | Conductivity and DO probe holder for Orion Star A-series armor   |
| <b>STARA-ESPH</b> | pH electrode holder for Orion Star A-series armor  |
| <b>1010003</b>    | Optional universal power adapter, 100-240 V, 50/60 Hz  |
| <b>087010MD</b>   | Orion RDO optical DO probe, 3m cable with stainless steel guard and calibration sleeve                       |
| <b>087020MD</b>   | Orion RDO optical DO probe, 6m cable with stainless steel guard and calibration sleeve                       |
| <b>087030MD</b>   | Orion RDO optical DO probe, 10m cable with stainless steel guard and calibration sleeve                      |
| <b>087050MD</b>   | Orion RDO optical DO probe, 15m cable with stainless steel guard and calibration sleeve                      |
| <b>087100MD</b>   | Orion RDO optical DO probe, 30m cable with stainless steel guard and calibration sleeve                      |
| <b>083005MD</b>   | Orion polarographic DO probe, 1.5m cable   |
| <b>080513</b>     | Orion polarographic DO probe maintenance kit   |
| <b>080514</b>     | Orion polarographic DO probe electrolyte solution, 60 mL   |
| <b>080017</b>     | Calibration sleeve for Orion polarographic DO probes   |
| <b>087003</b>     | Replacement calibration sleeve for Orion RDO optical probes  |
| <b>087001</b>     | Replacement optical cap for Orion RDO probes   |



- pH ■
- ISE ■
- ORP ■
- Cond ■
- RDO ■
- DO ■
- Temp ■



## Thermo Scientific Orion Star A123

### Dissolved Oxygen Portable Meter

Thermo Scientific Orion Star A123 Dissolved Oxygen Portable Meters combine simplicity with accuracy. A large LCD displays dissolved oxygen readings along with temperature. Icons provide quick updates on battery life and completed calibration status. Simple button layout and onscreen messages help with calibration and setup menu choices.

#### Features and Benefits

- Large, informative screen clearly shows the main information, including DO reading in mg/L or % saturation, temperature in °C or °F, meter mode and battery life
- Automatic temperature, manual salinity input and manual barometric pressure compensation for an accurate result
- Don't miss a reading – AUTO-READ™ locks in the stable reading on your screen and ready indicator alerts when readings are stable
- Two calibration options to meet your procedural requirements: water-saturated air method or a Winkler titration
- Accepts Thermo Scientific Orion polarographic dissolved oxygen probes
- Non-volatile memory holds up to 50 data points
- Four AA batteries (included) provide over 2000 hours of operation or purchase the universal power adapter (sold separately) to run meter on AC power
- Perfectly portable, waterproof and protected to take anywhere with a IP67-rated housing
- 3 year meter replacement warranty



- pH
- ISE
- ORP
- Cond
- RDO
- DO
- Temp

#### Product Specifications

|                      |                                       | CE   TUV   FCC                    |
|----------------------|---------------------------------------|-----------------------------------|
| Dissolved Oxygen     | <b>Concentration</b>                  |                                   |
|                      | Range                                 | 0 to 20 mg/L                      |
|                      | Resolution                            | 0.01, 0.1                         |
|                      | Relative Accuracy                     | ±0.2                              |
|                      | <b>% Saturation</b>                   |                                   |
|                      | Range                                 | 0 to 200                          |
|                      | Resolution                            | 0.1, 1                            |
|                      | Relative Accuracy                     | ±2 %                              |
|                      | Manual Barometric Pressure Correction | 450.0 to 850.0 mm Hg              |
|                      | Manual Salinity Factor Correction     | 0 to 45                           |
| Calibration Features | Water-saturated air, manual (Winkler) |                                   |
| Sensor Type          | Polarographic                         |                                   |
| Temperature          | Range                                 | 0 to 50 °C, 32 to 122 °F          |
|                      | Resolution                            | 0.1                               |
|                      | Relative Accuracy                     | ±0.1                              |
|                      | Offset Calibration                    | Yes                               |
| Datalogging          | Number of Datalogs                    | 50                                |
|                      | Log Function                          | Manual, Automatic with AUTO-READ™ |
| Inputs               | DO with Temperature Probe             | 9-pin mini-DIN                    |
| Power                | Power Cord                            | Optional – universal, 100-240 VAC |
|                      | Battery Power                         | Included – 4 AAs                  |
|                      | Battery Life                          | 2000 hrs                          |

#### Meter Ordering Information

| Cat. No.  | Description  |
|-----------|--|
| STARA1230 | Orion Star A123 Dissolved Oxygen Portable Meter<br>- Four AA batteries (installed)   |
| STARA1235 | Orion Star A123 Dissolved Oxygen Portable Meter Kit<br>- 083005MD Orion polarographic DO probe<br>- 080017 calibration sleeve for DO probe<br>- 080513 DO probe maintenance kit<br>- Protective armor with electrode holder<br>- Hard carrying case<br>- Four AA batteries (installed) |

#### Accessories

| Cat. No.   | Description  |
|------------|--|
| STARA-CS   | Hard carrying case for Orion Star A-series portable meters   |
| STARA-AR   | Armor for Orion Star A-series portable meters, includes electrode holders for pH, conductivity and DO probes |
| STARA-ESCD | Conductivity and DO probe holder for Orion Star A-series armor   |
| STARA-ESPH | pH electrode holder for Orion Star A-series armor  |
| 083005MD   | Orion polarographic DO probe, 1.5 m cable  |
| 080513     | Orion polarographic DO probe maintenance kit   |
| 080017     | Calibration sleeve for Orion polarographic DO probes   |
| 1010003    | Optional universal power adapter, 100-240 V, 50/60 Hz  |



## Thermo Scientific Orion Meter Accessories

For Orion Star A and VERSA STAR Series

With the new Orion meters, no details were too small. Even our accessories have undergone a redesign.

### Accessories

| Cat. No.   | Description  |
|------------|--|
| STARA-CS   | Hard field case  |
| 1210005    | Soft field case  |
| STARA-AR   | Armor for Orion Star A portable meters (includes pH electrode storage sleeve and holders for pH, conductivity and DO probes) |
| STARA-ESPH | Replacement pH electrode storage sleeve holder (for use with armor)  |
| STARA-ESCD | Replacement conductivity and DO storage sleeves holder (for use with armor)  |
| STARA-BEA  | Orion Star A electrode arm and holder head   |
| STARA-HB   | Weighted, detached base for electrode arm and holder head  |
| STARA-ELHD | Orion Star A electrode holder head (attaches to existing Orion Star electrode arm)   |
| 1010003    | Universal power adapter (for Orion Star A benchtop and portable meters)  |
| STARA-PWR  | Replacement universal power adapter for Orion VERSA STAR   |
| 1010004    | RS232 computer and printer cable set   |
| 1010006    | Star series inkjet printer, 110V/220V and cable  |
| 1010008    | Ink cartridge for Orion Star series printer  |
| 1010009    | Paper for Orion Star series printer  |
| 1010053    | RS232 computer cable   |
| 096019     | Orion Star stirrer probe (automatic stirrer probe with paddle for benchtop Orion Star series meters)                         |
| 096021     | Replacement paddles for 096019 - 3 pack  |
| 090045     | BNC shorting cap   |



Armor (cat. no. STARA-AR) adds extra meter protection. The strap can attach to a belt or pipe to keep the meter close to the tester or test site. The built-in stand in the armor works great for additional hands-free operation.



The redesigned electrode holder head (cat. no. STARA-ELHD, sold separately or included with cat. no. STARA-BEA) reduces the amount of sample needed for testing since the probe heights are adjustable.



STARA-HB



STARA-CS



## Thermo Scientific Orion Meter Accessories

For Orion Star, Star Plus, Aplus and PerpHecT Meter Series

To make sure you have everything you need to attain accurate results for your applications, we offer a multitude of accessories for both field and lab applications. From printers to field cases, electrode stands and stirrers, we have it all. Below are the top selling accessories – for complete details, please visit [www.thermoscientific.com/water](http://www.thermoscientific.com/water).

### Aplus™ and PerpHecT® Meter Accessories

| Cat. No. | Description  |
|----------|--|
| 020125   | 110 V power adapter  |
| 020130   | 220 V power adapter  |
| 020135   | 240 V power adapter  |
| 090043   | Swing arm electrode stand  |
| 090070   | Basic electrode stand and holder   |
| 910002   | Universal electrode holder for basic electrode stand   |
| 090045   | BNC shorting cap   |
| 0900A0   | 900A thermal printer for Aplus meters, 110 V   |
| 0900A1   | 900A thermal printer for Aplus meters, 220 V   |
| 0900A7   | 900A thermal printer for Aplus meters, 240 V   |
| 0900A4   | Paper for 900A printer   |
| 0900A6   | Battery pack for 900A printer  |
| PRT300   | PRT300 ink printer and cable for Aplus and PerpHecT meters, 110 V  |
| PRT301   | PRT300 ink printer and cable for Aplus and PerpHecT meters, 220 V  |
| PRT302   | Ink ribbon for PRT300 printer  |
| OACBLO   | RS232 computer cable for Aplus and PerpHecT meters   |
| OPBLSK   | Aplus portable meter starter kit – includes field case, field stand, beaker, 2 x 60 mL bottles each of pH 4.01, 7.00, and 10.01 buffers, and 1 x 60 mL bottle of pH storage solution         |
| OBCHSK   | Aplus benchtop meter starter kit – includes basic electrode stand and holder, 917005 epoxy ATC probe, and 1 x 475 mL bottle each of pH 4.01, 7.00, and 10.01 buffers and pH storage solution |
| 0607CA   | 607 multi-channel electrode switchbox and cables, 110 V  |
| 0607CI   | 607 multi-channel electrode switchbox and cables, 220 V  |



Orion Star Stirrer Probe in action – sample mixing without separate stirrer

Orion Star Stirrer Probe, Cat. No. 096019 and Swing Arm Stand, Cat. No. 090043



Hard Field Case, Cat. No. 1210004



Soft Field Case, Cat. No. 1210005

### Orion Star™ Series Meter Accessories

| Cat. No. | Description  |
|----------|--|
| 1010003  | Universal power adapter  |
| 1010004  | RS232 computer and printer cable set   |
| 1010005  | RS232 to USB cable adapter   |
| 1010006  | Orion Star series inkjet printer, 110 V/220 V and cable  |
| 1010008  | Ink cartridge for Orion Star series printer  |
| 1010009  | Paper for Orion Star series printer  |
| 1010053  | RS232 computer cable   |
| 1210001  | Portable star series electrode stand   |
| 1210002  | Meter impact jacket and electrode storage chamber  |
| 1210003  | Electrode storage chamber (for meter impact jacket)  |
| 1210004  | Hard field case  |
| 1210005  | Soft field case  |
| 096019   | Orion Star stirrer probe (automatic stirrer probe with paddle for benchtop Orion Star series meters)   |
| 096021   | Replacement paddles for 096019 – 3 pack  |
| 090043   | Swing arm electrode stand  |
| 090044   | Electrode holder head with 15mm dia cond cell slot, for use with 090043  |
| 090045   | BNC shorting cap   |
| 1010050  | Adapter – MiniDIN ATC probe to 3.5 mm phono tip meters (310, 320, 330, 350, 370, 555A, 550A, 535A, and 162A)   |
| 1010051  | Adapter – MiniDIN ATC probe to 8 pin DIN meters (210Aplus, 230Aplus, 250Aplus, 290Aplus, 410Aplus, 420Aplus, 520Aplus, 525Aplus, 710Aplus, 720Aplus, and 920Aplus) |
| 1010800  | Adapter – MiniDIN DO probe to 8 pin waterproof DIN DO meters (830A, 835A and 862A)   |
| 1010801  | Adapter – MiniDIN DO probe to 8 pin DIN DO meters (805Aplus, 810Aplus, and 850Aplus)   |
| 1010900  | Adapter – MiniDIN conductivity probe to 8 pin waterproof DIN conductivity meters (1230, 555A, 550A, 162A, 135A, and 130A)  |
| 1010901  | Adapter – MiniDIN conductivity probe to 8 pin DIN conductivity meters (150Aplus, 145Aplus, 125Aplus, 115Aplus, and 105Aplus)                                       |



# Thermo Scientific Orion Intrinsicly Safe\* Meters



## Features and Benefits

- For use where non-sparking equipment is desired, these carry US intrinsically safe approval rating by Factory Mutual (FM)\*
- Waterproof, portable models for basic field measurements
- 266S and 136S meters include RS232 output, advanced GLPdoc 100 point datalogger with time and date stamp and includes software program for simplified data collection and remote operation on a computer
- Accepts Waterproof DIN, dual banana plug connections
- Units use 3 AA batteries
- 131S and 136S meters offer linear and non-linear temperature compensation for natural and ultrapure water applications
- 3 year meter warranty

\* Does not meet European Intrinsicly Safe specification.

## Accessories

| Cat. No. | Description    |
|----------|----------------|
| 013655   | Electrode clip |

## Product Specifications

|          |                         | 266S/261S                                       | 136S/131S                                       |
|----------|-------------------------|---|---|
| pH       | Range                   | -2.00 to 16.00                                  | —   |
|          | Resolution              | 0.1, 0.01                                       | —   |
|          | Relative Accuracy       | ±0.01   | —   |
|          | Auto-Buffer Recognition | Dependent on buffer set (7 pre-programmed sets) | —   |
|          | Calibration Points      | 3   | —   |
| mV       | Range                   | ±1300.0   | —   |
|          | Resolution              | ±0.1  | —   |
|          | Relative Accuracy       | ±0.1 % of value +0.3 mV                         | —   |
| Cond     | Range                   | —   | 0.00 to 500 mS                                  |
|          | Resolution              | —   | 0.01 up to 99.99 µS/cm<br>0.1 above 99.99 µS/cm |
|          | Relative Accuracy       | —   | ±0.5 % of measured value + 1 count              |
|          | Calibration Points      | —   | 1   |
| Salinity | Cell Constants          | —   | 0.010 to 199.0 cm <sup>-1</sup>                 |
|          | Range                   | —   | 0 to 45.0 (10 to 30 °C) g/kg                    |
| TDS      | Resolution              | —   | 0.1   |
|          | Range                   | —   | 0 to 1999 mg/L (10 to 40 °C)                    |
| Temp     | Resolution              | —   | 1   |
|          | Range                   | -20 to 120 °C                                   | -20 to 120 °C                                   |
|          | Relative Accuracy       | ±0.3 °C   | ±0.3 °C   |

## Portable Meter and Electrode

| Cat. No. | Meter | Sensor (s)                             |
|----------|-------|--|
| 0261S0   | 261S  | 9109WHP low maintenance pH/ATC Triode™ |
| 0266S0   | 266S  | 9109WHP low maintenance pH/ATC Triode  |
| 0131S0   | 131S  | 013010A DuraProbe™ conductivity cell   |
| 0136S0   | 136S  | 013010A DuraProbe conductivity cell    |

## Portable Meter, Electrode and Field Kit

| Cat. No. | Meter | Sensor (s)                            | Accessories & Solutions   |
|----------|-------|---------------------------------------|---|
| 0261S3   | 261S  | 9109WHP low maintenance pH/ATC Triode | Neck strap, field case, stand, electrode holder, beakers, 4, 7 and 10 buffers                           |
| 0266S3   | 266S  | 9109WHP low maintenance pH/ATC Triode | Neck strap, field case, stand, electrode holder, beakers, 4, 7 and 10 buffers, RS232 cable and software |
| 0131S3   | 131S  | 013010A DuraProbe conductivity cell   | Beakers, standards  |
| 0136S3   | 136S  | 013010A DuraProbe conductivity cell   | Beakers, standards, RS232 cable and software  |

We have more to present in our newly revamped electrodes & accessories sections. Keep going!



Orion Intrinsicly Safe Meters

- pH
- ISE
- ORP
- Cond
- DO
- Temp





## Thermo Scientific Orion pH Electrode Features

Select features to meet the needs of your applications

Please visit  
[www.thermoscientific.com/waterlibrary](http://www.thermoscientific.com/waterlibrary)  
 for more product  
 information.

The Thermo Scientific Orion electrode line offers a wide variety of quality pH electrodes to choose from. There are many different factors to consider when you selecting a pH electrode to ensure you select the electrode that will suit your needs. You will need to consider body materials, body styles, and sample requirements. Below is a quick guide to help you choose the correct pH electrode. If you still require assistance, please contact our technical service department at 800-225-1480 or 978-232-6000.

### Body Materials

| Glass Body  | Epoxy Body  |
|---|---|
|  |                    |
| Compatible with virtually any sample, including solvents                          | Extremely durable, rugged body prevents breakage  |
| Easy to clean   | Electrode bulb protected by bulb guard  |
| Can handle higher temperature   | Low-maintenance gel-filled can be used in higher temperatures than glass low-maintenance electrodes |

### pH Body Style

| Standard  | Semi-Micro  |
|---|---|
|  |  |
| 12 mm diameter  | 6-8 mm diameter   |
| Used in a wide variety of samples   | For small samples sizes down to 200 µL  |
| Micro   | Rugged Bulb   |
|  |  |
| 1-5 mm diameter   | Glass body  |
| For samples as small as 0.5 µL and containers as small as 384 well plates           | Extra durable pH bulb to prevent breakage   |
| Spear Tip   | Flat Surface  |
|  |  |
| For piercing solid or semi-solid samples  | For measuring surfaces of solid or gel samples                                      |
| Can be used for small volumes   | For use with small volumes  |

### Fill Type

| Refillable (Glass or Epoxy Body)                                    | Polymer Filled (Sealed Glass or Epoxy Body) | Gel Filled (Sealed Epoxy Body)                      |
|---|---|---|
| Filling solution required   | No filling solution needed                  | No filling solution needed                          |
| Easy maintenance, periodic filling and draining needed              | Low maintenance, sealed reference           | Low maintenance, sealed reference                   |
| Longer expected life  | Easy to use                                 | Easy to use   |
| For use in a wide variety of applications                           | For use in a wide variety of applications   | General purpose for everyday use                    |
| Best precision, 0.01 to 0.02 pH                                     | 0.02 pH precision                           | 0.05 to 0.1 pH precision                            |
| Most rapid response time  | Better response time                        | Good response time                                  |
| Longest warranty, 1-2 years (6 months for Ag/AgCl micro electrodes) | 1 year warranty                             | 3-6 month warranty (18 months for ROSS 8107 models) |

### Reference Styles

| ROSS Ultra®/ ROSS Reference®                | Double Junction Ag/AgCl                     | Single Junction Ag/AgCl          |
|---|---|----------------------------------|
| 0.01 pH precision                           | 0.02 pH precision                           | 0.02 to 0.1 pH precision         |
| Best measurement response time              | Better measurement response time            | Good measurement response time   |
| Best temperature response                   | Good temperature response                   | Good temperature response        |
| Ideal for TRIS, protein and sulfide samples | Ideal for TRIS, protein and sulfide samples | General purpose for everyday use |
| Variety of body styles and types            | Variety of body styles and types            | Variety of body styles and types |
| Refillable or gel filled design             | Refillable, polymer or gel filled design    | Refillable or gel filled design  |

### Junctions – Sure-Flow, Sleeve, Open, Ceramic, Wick and Glass Fiber

| Sure-Flow®, Sleeve and Open  | Ceramic and Glass Capillary                                 | Wick and Glass Fiber  |
|--|---|---|
| Best junction for dirty, difficult samples and demanding lab use     | Better junction for routine lab use in a variety of samples | Good junction for routine lab use or field use in buffers and aqueous samples |
| Junction is clog free, easy to clean and has longest use life        | Junction is high quality and durable                        | Good junction with durability   |
| Ideal for thick or viscous samples, compatible with all sample types | Ideal for most lab applications and sample types            | Ideal for basic lab applications and aqueous samples                          |







## Thermo Scientific Electrode Styles

### Thermo Scientific Orion Electrode Families and Types

Thermo Scientific Orion pH electrodes have a variety of different family of electrodes available to help with your measurements needs. They are designed to meet all your measurement needs.

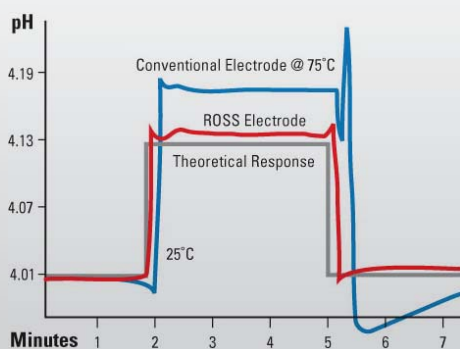
#### Triodes

Combination pH electrode with built-in temperature sensor. Convenience with being able to measure pH and temperature with one electrode. BNC connector for pH measurement and alternative connector for temperature measurement. Compatible with only Thermo Scientific Orion pH meters as temperature connector and temperature element are unique to meter model.

#### ROSS Ultra® and ROSS® Electrodes

The best electrode available anywhere! Has the fastest response, best accuracy and reproducibility despite sample composition. Exhibits unmatched response to temperature variations. Double junction reference for complex samples such as biological media, foods, pharmaceuticals, TRIS, sulfides and proteins. Available in all body styles. ROSS Ultra electrodes have an industry best warranty.

The graph shows how ROSS electrodes respond versus the best of conventional pH electrodes. The ROSS electrode continues to show fast reproducibility and accuracy after many dramatic temperature changes.



Temperature Response of the ROSS Ultra® and ROSS® Electrodes vs. Conventional Electrodes

### AquaPro Professional pH Electrodes

Low maintenance polymer filled double junction electrode. For use in TRIS, sulfides, proteins and biological media. Has an extended life, fast response and clog resistant open junction. Available in standard, semi-micro, rugged bulb and flat surface body styles. The junction must be kept wet.

#### Double Junction

Isolated Ag/AgCl reference system which prevents silver from coming in contact with the sample. Great for measuring TRIS buffer, sulfide and protein samples. Available in standard and micro body styles.

#### No Cal®

Unique reference system that provides quick and accurate measurements. Great for measuring TRIS buffers sulfide and protein samples. No calibration required and accurate to 0.1 pH without calibration. Has the benefit of having a ceramic junction in an epoxy body and also a built-in temperature sensor.

#### Standard

A large variety of electrodes for a wide range of applications. Includes specialty pH electrodes for unique or challenging pH measurements. Available in most body styles. Micro electrodes capable of measuring samples as small as 0.5  $\mu$ L in containers as small as 384 well plates.

#### KNipHE®

The pH electrode is housed in a body with a stainless steel blade for measuring meat, cheese and sludge samples.

#### Economy or Low-Maintenance

Good performance, valued priced, durable and low maintenance gel-filled pH electrodes. Available in standard, semi-micro and flat surface body styles.

#### Redox/ORP

The ideal choice for measuring the oxidation reduction potential of samples and performing redox titrations.

#### ATC Probes

Automatic temperature compensation probes measure sample temperatures and adjust pH measurements by correcting the electrode slope according to the measured temperature.



## Thermo Scientific Orion pH Electrode Selection Guide

| Sample Type   | Electrode Recommendations  |
|---|--|
| <b>pH Precision</b>   |  |
| <b>Biological/Pharmaceutical – TRIS buffer, proteins, enzymes</b>                     | Electrodes should have a ROSS or double junction Ag/AgCl reference (no sample contact with silver)   |
| <b>Education/Student Use</b>  | Electrodes should have an epoxy body for added durability  |
| <b>Emulsions – Foods, cosmetics, oils</b>   | Electrodes should have a Sure-Flow or open junction to prevent the electrode from clogging   |
| <b>Emulsions – Petroleum products, paint</b>  | Electrodes should have a glass body that resists damage from the sample and a Sure-Flow or open junction to prevent the electrode from clogging                  |
| <b>Flat Surfaces – Cheese, meat, agar</b>   | Electrodes should have a flat-surface tip and ROSS or double junction Ag/AgCl reference (no sample contact with silver)  |
| <b>Flat Surfaces – Paper</b>  | Electrodes should have a flat-surface tip  |
| <b>General Purpose – Most sample types</b>  | All electrodes are suitable for general purpose measurements   |
| <b>Harsh Environments – Field or plant use, rugged use</b>                            | Electrodes should have an epoxy body for added durability and be polymer or gel filled for easy maintenance  |
| <b>High Ionic Strength – Acids, bases, brines, pH &gt; 12 or pH &lt; 2</b>            | Electrodes should have a Sure-Flow or open junction for better contact with the sample and more stable measurements  |
| <b>Large Sample Sizes – Tall flasks</b>   | Electrodes should have a long body that fits the container   |
| <b>Low Ionic Strength – Treated effluent, deionized water, distilled water</b>        | Electrodes should be refillable for better contact with the sample and more stable measurements  |
| <b>Non-aqueous – Solvents, alcohols</b>   | Electrodes should have a glass body that resists damage from the sample and a Sure-Flow junction for better contact with the sample and more stable measurements |
| <b>Semi-solids – Fruit, meat, cheese</b>  | Electrodes should have a spear tip for piercing samples and a ROSS or double junction Ag/AgCl reference  |
| <b>Small Sample Size – Micro-titer plates</b>   | Electrodes should have a small diameter that fits the container  |
| <b>Small Sample Size – NMR tubes</b>  | Electrodes should have a small diameter that fits the container  |
| <b>Small Sample Size – Test tubes, small flasks and beakers</b>                       | Electrodes should have a small diameter that fits the container  |
| <b>Small Sample Size – TRIS buffer, proteins, sulfides</b>                            | Electrodes should have a small diameter that fits the container and a ROSS or double junction Ag/AgCl reference  |
| <b>Titration</b>  | Electrodes should have a Sure-Flow or sleeve junction for better contact with the sample and more stable measurements  |
| <b>Viscous Liquids – Slurries, suspended solids sludges</b>                           | Electrodes should have a Sure-Flow or open junction to prevent the electrode from clogging   |
| <b>Waters – Acid rain, boiler feed water, distilled water, rain water, well water</b> | Electrodes should have a ROSS or double junction Ag/AgCl reference and be refillable for better contact with the sample  |
| <b>Waters – Drinking water, tap water</b>   | Electrodes should have an epoxy body for added durability  |
| <b>Waters – Wastewater, seawater</b>  | Electrodes should have a ROSS or double junction Ag/AgCl reference and have an epoxy body for added durability   |



| ROSS Ultra®                                      | ROSS®  | AquaPro                                    | Standard Ag/AgCl                             | Green  | Micro Ag/AgCl    | Double Junction      | Economy/Basic    |
|--|--|--|--|--|------------------|----------------------|------------------|
| 0.01   | 0.01   | 0.02                                       | 0.02   | 0.02 to 0.05   | 0.02             | 0.02                 | 0.05 to 0.1      |
| 8102BNUWP<br>8107BNUMD<br>8156BNUWP<br>8157BNUMD | 8102BN<br>8104BN<br>815600<br>8165BNWP<br>8172BNWP | 9102AP<br>9104APWP<br>9107APMD<br>9156APWP |  | GD9106BNWP<br>GD9156BNWP                             |                  | 9102DJWP<br>9156DJWP |                  |
| 8107BNUMD<br>8156BNUWP<br>8157BNUMD              | 815600<br>8165BNWP                                 | 9107APMD<br>9156APWP                       | 9107BNMD<br>9156BNWP<br>9157BNMD             | GS9106BNWP<br>GD9106BNWP                             |                  | 9156DJWP             | 9106BNWP         |
|  | 8165BNWP<br>8172BNWP                               | 9104APWP<br>9107APMD                       | 9165BNWP<br>9172BNWP                         |  |                  |                      |                  |
|  | 8172BNWP   | 9102AP<br>9104APWP                         | 9172BNWP                                     |  |                  |                      |                  |
| 8135BNUWP  | 8135BN   | 9135APWP                                   |  |  |                  |                      |                  |
| 8135BNUWP  | 8135BN   | 9135APWP                                   |  |  |                  |                      | 913600           |
| 8102BNUWP<br>8107BNUMD<br>8156BNUWP<br>8157BNUMD | 8102BN<br>8104BN<br>815600<br>8165BNWP<br>8172BNWP | 9102AP<br>9104APWP<br>9107APMD<br>9156APWP | 9102BNWP<br>9107BNMD<br>9156BNWP<br>9157BNMD | GS9106BNWP<br>GD9106BNWP<br>GS9156BNWP<br>GD9156BNWP |                  | 9102DJWP<br>9156DJWP | 9106BNWP         |
| 8107BNUMD  |  | 9107APMD<br>9156APWP                       | 9107BNMD                                     | GS9106BNWP<br>GD9106BNWP                             |                  | 9156DJWP             | 9106BNWP         |
|  | 8165BNWP<br>8172BNWP                               | 9104APWP<br>9107APMD<br>9102AP             | 9165BNWP<br>9172BNWP                         |  |                  |                      | 912600           |
| 8102BNUWP<br>8156BNUWP<br>8157BNUMD              | 8102BN<br>815600<br>8165BNWP<br>8172BNWP           |  | 9165BNWP<br>9172BNWP                         | GS9156BNWP<br>GD9156BNWP                             |                  | 9102DJWP             |                  |
|  | 8172BNWP   |  | 9172BNWP                                     |  |                  |                      |                  |
|  | 8163BNWP   |  |  |  |                  | 9120APWP             |                  |
|  | 8220BNWP   |  |  |  | 9810BN           |                      |                  |
|  |  |  |  |  | 9826BN           |                      |                  |
| 8103BNUWP<br>8115BNUWP                           | 8103BN<br>8115BN<br>8175BNWP                       | 9103APWP<br>9115APWP                       | 9103BNWP                                     |  | 9810BN<br>9826BN | 9110DJWP             | 911600<br>912600 |
| 8103BNUWP<br>8115BNUWP                           | 8103BN<br>8115BN<br>8175BNWP                       | 9103APWP<br>9115APWP                       |  |  |                  | 9110DJWP             |                  |
|  | 8162SC<br>8165BNWP<br>8172BNWP                     |  |  |  |                  |                      |                  |
|  | 8165BNWP<br>8172BNWP                               | 9104APWP<br>9107APMD                       | 9165BNWP<br>9172BNWP                         |  |                  |                      |                  |
| 8102BNUWP<br>8156BNUWP<br>8157BNUMD              | 8102BN<br>815600<br>8165BNWP<br>8172BNWP           |  | 9165BNWP<br>9172BNWP                         | GS9156BNWP<br>GD9156BNWP                             |                  | 9102DJWP             |                  |
| 8156BNUWP<br>8157BNUMD                           | 815600<br>8165BNWP                                 | 9107APMD<br>9156APWP                       | 9156BNWP<br>9165BNWP                         | GS9106BNWP<br>GD9106BNWP                             |                  | 9156DJWP             | 9106BNWP         |
| 8156BNUWP<br>8157BNUMD                           | 815600<br>8165BNWP                                 | 9107APMD<br>9156APWP                       | 9165BNWP                                     | GD9106BNWP<br>GD9156BNWP                             |                  | 9156DJWP             |                  |



## Thermo Scientific Orion ROSS pH Electrodes

The Best Choice For Superior Stability, Rapid Response, Accurate and Reproducible pH Measurements

ROSS pH electrodes offer unmatched benefits that you will not find in any other pH electrode. For more than 30 years, ROSS pH electrodes have been providing the best accuracy, stability and response you will find in a pH electrode. Before selecting an electrode, consider the advantages you will have if you choose a ROSS electrode.

### Rapid Response and Superior Stability

Compared to conventional electrodes, the proven ROSS reference system exhibits superior stability in measurements, faster response, greater accuracy and precision when measuring samples that vary in temperature or when calibrating in temperatures that differ from your samples.

ROSS electrodes are much more stable over time and avoid the long term drift that other electrodes exhibit. Electrodes drift by less than 0.002 pH per day so recalibration is minimized.

### Temperature Response

Most ROSS electrodes have a temperature range of 0 to 100 °C and show rapid response and stability even when measuring samples that differ by as much as 50 °C. The readings are much more accurate than standard electrodes in samples with extreme temperature variations. ROSS electrodes provide the correct reading within 30 seconds while standard electrodes are still trying to equilibrate and provide the correct reading after 3 minutes. The graph on page 63 illustrates this response.

### No Sample Contamination

Standard silver chloride electrodes leach metal into the fill solution and eventually into the sample. ROSS electrodes do not contain any silver or mercury to react with the sample or to clog the electrode junction which causes sluggish response or inaccurate readings while also reducing electrode life. ROSS pH electrodes can be used in samples such as biological media, foodstuffs and pharmaceuticals where trace amount of metals cannot be tolerated.

### Double Junction Design

This design allows you more control over an important variable. In order to minimize errors caused by junction potential, you can use a solution that is similar to the sample. The user also has the ability to change filling solutions to minimize contamination when potassium or chloride in the sample are undesirable.

ROSS electrodes have two main families to choose from. Each family has a variety of electrode options to choose from to ensure you have the correct electrode for your measurement needs. All contain the advantages mentioned previously.

### ROSS Ultra®

ROSS Ultra electrodes offer the best stability and drift free measurements of all ROSS electrodes. The reference system is designed to provide an enhanced life. We are so confident of it that the warranty is double that of standard ROSS electrodes. Refillable ROSS Ultra electrodes have a 2 year warranty while the low-maintenance triode™ has an 18 month warranty.

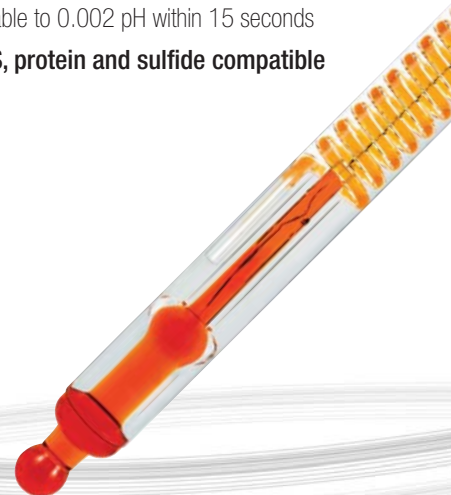
The ROSS Ultra line features glass or epoxy electrodes, refillable or low-maintenance design, flat surface and semi-micro designs. ROSS Ultra Triodes include a built-in temperature sensor and provide faster temperature response than other 3-in-1 electrodes.

### ROSS®

Standard ROSS electrodes provide the same rapid response, accuracy and temperature response of all ROSS electrodes. The reference system provides excellent stability. These electrodes provide a one year warranty. They are available in a variety of styles such as the clog free Sure-Flow junction, glass or epoxy electrodes, flat surface, semi-micro, micro and spear tip designs. All standard ROSS electrodes have a refillable design and do not contain a built-in-temperature element.

### ROSS Electrode Specifications:

- **Slope:** 92-102 % of theoretical Nernst slope
- **Isopotential Point:** pH 7
- **Accuracy of measuring a pH 6.86 buffer after standardization at 25 °C:** Accurate within 0.03 pH for buffer at any temperature between 0-100 °C using automatic temperature compensation
- **Speed of Response in 6.86 buffer going from 25 to 75 °C:** Response stable to 0.01 pH within 30 seconds
- **Speed of Response between 6.86 and 4.01 buffers at 25 °C:** Response stable to 0.002 pH within 15 seconds
- **Mercury free, TRIS, protein and sulfide compatible**





# Thermo Scientific Orion Sure-Flow pH Electrodes

Clog Free Long Lasting Junction

## Sure-Flow® Junction

The unique, free-flowing liquid-to-liquid junction assures you of the most stable, drift-free measurements. The easy-to-clean junction never clogs, simply press the cap and flush the junction area. Release the cap and the junction is reset. Now even the most problematic, dirty or viscous samples can be easily measured without a clogged junction! The Sure-Flow junction has proven reliability and extends the electrode life.

ROSS electrodes provide unmatched accuracy and response to extreme temperature changes. They are compatible with samples containing organic compounds, proteins, heavy metals, and other compounds that react with silver such as bromides, iodides, cyanides and sulfides.

Silver chloride sure-flow electrodes can be used on tough samples that do not require a double junction electrode to prevent contact with silver.

ROSS Sure-Flows are also available as semi-micro pH and reference half cell electrodes on pages 75 and 80.

**High performance in all samples**



**ROSS® Sure-Flow® combination pH electrode with glass body**

- Sure-Flow junction prevents clogging
- For soil, sludge, colloids, viscous material and organic solvents

**Fast response – even in difficult samples**



**ROSS® Sure-Flow® combination pH electrode with epoxy body**

- Ideal for soil samples
- Durable epoxy design
- For TRIS, sulfides and proteins

**For all samples including solvents**



**Sure-Flow® combination pH electrode with glass body**

- For soil, sludge, colloids, and viscous material
- Chemical resistant glass body

**Fast response in difficult samples & soils**



**Sure-Flow® combination pH electrode with epoxy body**

- Rugged, durable epoxy design
- Has removable bulb guard

| Cat. No.                                    | 8172BNWP                | 8165BNWP<br>8165DN                | 9172BNWP                    | 9165BNWP                    |
|---|-------------------------|-----------------------------------|-----------------------------|-----------------------------|
| <b>pH Range</b>                             | 0-14                    | 0-14                              | 0-14                        | 0-14                        |
| <b>pH Precision</b>                         | 0.01                    | 0.01                              | 0.02                        | 0.02                        |
| <b>Temp. Range</b>                          | 0-100 °C                | 0-100 °C                          | 0-100 °C                    | 0-100 °C                    |
| <b>Internal Reference</b>                   | ROSS                    | ROSS                              | Ag/AgCl                     | Ag/AgCl                     |
| <b>Junction</b>                             | Sure-Flow               | Sure-Flow                         | Sure-Flow                   | Sure-Flow                   |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)        | 3 M KCl (810007)                  | 4 M KCl w/ Ag/AgCl (900011) | 4 M KCl w/ Ag/AgCl (900011) |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm           | L - 120 mm<br>D - 12 mm     | L - 120 mm<br>D - 12 mm     |
| <b>Connector Type</b>                       | BNC Waterproof          | BNC Waterproof<br>EDIN Waterproof | BNC Waterproof              | BNC Waterproof              |

| Cat. No.      | Recommended Accessories  |
|---------------|--------------------------|
| <b>810001</b> | ROSS storage solution    |
| <b>810007</b> | ROSS fill solution       |
| <b>900011</b> | Ag/AgCl fill solution    |
| <b>910001</b> | Ag/AgCl storage solution |



### Key Information

ROSS electrodes are environmentally-safe mercury-free option for TRIS, protein and sulfide. All cap diameters are 16 mm at bottom of cap. All cable lengths are 1 meter.



## Thermo Scientific Orion Triode pH Electrodes

Measures pH and Temperature with One Electrode

All Thermo Scientific Orion Triodes™ have built-in temperature sensors allowing you to measure pH and temperature with one electrode. There are a variety of electrodes based on your sample and application.

The ROSS Ultra Triodes offer such great stability and drift that the warranty period is double other electrodes. The refillable electrodes have a two year replacement warranty. The gel-filled ROSS Ultra Triode electrodes have an 18 month warranty.

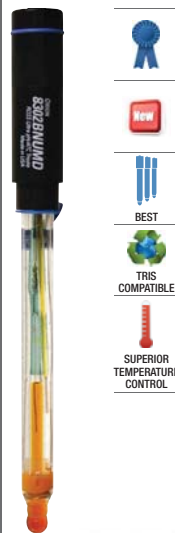
Complex samples, such as biological media, foods and pharmaceuticals, can be measured easily. All ROSS Ultra electrodes can be used in samples that contain TRIS, sulfides or proteins.

ROSS Ultra electrodes offer the best temperature performance of all other electrodes in repeated, varying temperatures.

The AquaPro Triode has the advantage of having an open junction that does not clog and double junction reference. For use in samples with TRIS, protein and sulfides.

Ag/AgCl Triodes have good response and are ideal for routine measurements.

### Top performance with glass body



#### ROSS Ultra® pH/ATC Triode with glass body

- High performance for QC and research
- Chemical resistant glass body

### Low maintenance with extended life



#### ROSS Ultra® pH/ATC Triode with epoxy body, low maintenance gel

- Low maintenance gel
- Rugged epoxy body

### Refillable, convenience and durable



#### ROSS Ultra® pH/ATC Triode with epoxy body

- General purpose, high performance
- Rugged epoxy body

|   | <b>8302BNUMD (Star)</b>         | <b>8107BNUMD (Star)*<br/>8107UWMMMD (Star)</b>                           | <b>8157BNUMD (Star)*<br/>8157UWMMMD (Star)</b>                           |
|---|---------------------------------|--|--|
| <b>Cat. No.</b>                             | <b>8302BNUMD (Star)</b>         | <b>8107BNUMD (Star)*<br/>8107UWMMMD (Star)</b>                           | <b>8157BNUMD (Star)*<br/>8157UWMMMD (Star)</b>                           |
| <b>pH Range</b>                             | 0-14                            | 0-14   | 0-14   |
| <b>pH Precision</b>                         | 0.01                            | 0.01   | 0.01   |
| <b>Temp. Range</b>                          | 0-100 °C                        | 0-80 °C  | 0-100 °C   |
| <b>Temp. Accuracy</b>                       | ±1.0 °C                         | ±1.0 °C  | ±1.0 °C  |
| <b>Internal Reference</b>                   | ROSS                            | ROSS   | ROSS   |
| <b>Junction</b>                             | Ceramic                         | Glass capillary  | Glass fiber  |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)                | —  | 3 M KCl (810007)   |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 120 mm<br>D - 12 mm         | L - 120 mm<br>D - 12 mm  | L - 120 mm<br>D - 12 mm  |
| <b>Connector Type</b>                       | BNC Waterproof - MiniDIN (Star) | BNC Waterproof - MiniDIN (Star)*<br>BNC Waterproof - MiniDIN (Star)* 3 m | BNC Waterproof - MiniDIN (Star)*<br>BNC Waterproof - MiniDIN (Star)* 3 m |

| <b>Cat. No.</b> | <b>Recommended Accessories</b> |
|-----------------|--------------------------------|
| <b>810001</b>   | ROSS storage solution          |
| <b>810007</b>   | ROSS fill solution             |
| <b>900001</b>   | Ag/AgCl fill solution          |
| <b>910001</b>   | Ag/AgCl storage solution       |



**Electrode maintains calibration for one year**



- BEST
- TRIS COMPATIBLE
- SUPERIOR TEMPERATURE CONTROL

**No Cal<sup>®</sup> combination pH electrode with epoxy body and built-in ATC**

- Designed for stable, high performance pH analysis in the field
- Accurate to 0.1 pH without calibration

**Rugged design with clog free open junction**



- BETTER
- TRIS COMPATIBLE

**AquaPro pH/ATC Triode™ with low maintenance polymer, epoxy body**

- Low maintenance for Star meters

**Low maintenance**



- BETTER

**pH/ATC Triode™ with epoxy body, low maintenance gel**

- Low maintenance gel
- Epoxy body for ruggedness

**Low maintenance**



- BETTER

**pH/ATC Triode™ with epoxy body, low maintenance**

- Low maintenance gel
- Epoxy body for ruggedness

**Refillable and durable**



- BETTER

**pH/ATC Triode™ with epoxy body, refillable**

- Long-lasting
- Epoxy body for ruggedness

**Low maintenance and reliable**



- GOOD

**pH/ATC Triode™ with epoxy body, low maintenance gel**

- General purpose
- For Russell RL060P meter

| 5107BNMD (Star)<br>5107NC (A+ Series)           | 9107APMD (Star)         | 9107BNMD (Star)*<br>9107WMMMD (Star)*<br>9107WLMD (Star)*<br>9107BN (A+ Series)<br>9107WP† | 9109WP<br>9109WL                         | 9157BNMD (Star)<br>9157BN (A+ Series)           | 9147BN                  |
|---|-------------------------|--|--|---|-------------------------|
| 0-14  | 0-14                    | 0-14   | 0-14                                     | 0-14  | 0-14                    |
| 0.01  | 0.02                    | 0.02   | 0.02                                     | 0.02  | 0.1                     |
| 0-100 °C  | 0-60 °C                 | 0-80 °C  | 0-80 °C                                  | 0-90 °C   | 0-50 °C                 |
| ±1.0 °C   | ±2.0 °C                 | ±2.0 °C  | ±2.0 °C                                  | ±2.0 °C   | ±2.0 °C                 |
| Platinum  | Ag/AgCl Double junction | Ag/AgCl  | Ag/AgCl                                  | Ag/AgCl   | Ag/AgCl                 |
| Ceramic   | Open                    | Wick   | Wick                                     | Glass fiber                                     | HDPE pin                |
| No Cal (510011)                                 | —                       | —  | —  | 4 M KCl w/ Ag/AgCl (900011)                     | —                       |
| L - 120 mm<br>D - 12 mm                         | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm  | L - 120 mm<br>D - 12 mm<br>Cap D - 22 mm | L - 120 mm<br>D - 12 mm                         | L - 120 mm<br>D - 12 mm |
| BNC - MiniDIN (Star)<br>BNC - 8 Pin (A+ Series) | BNC - MiniDIN (Star)    | BNC - MiniDIN (Star)<br>BNC - 8 Pin (A+ Series)†   | EDIN Waterproof<br>Banana Plug           | BNC - MiniDIN (Star)<br>BNC - 8 Pin (A+ Series) | BNC<br>2.5 mm Phono Tip |



**Key Information**

Cable lengths range from 1 to 6 meters  
WMMMD = 3 meters, WLMD = 6 meters,  
9109WL = 6 meters  
9109 cap is for intrinsically safe meters



## Thermo Scientific Orion Glass Refillable pH Electrodes

Chemical Resistant Glass Bodies

Glass body electrodes offer superior chemical resistance. They are also able to withstand higher temperatures than epoxy electrodes, with some models able to be used up to 100 °C. Glass electrodes are also easy to clean as they are compatible with most solvents and inorganic materials.

ROSS Ultra and ROSS electrodes provide unmatched ROSS accuracy and rapid response to temperature extremes. All are TRIS compatible. ROSS Ultra glass electrodes have an industry best 2 years warranty.

AquaPro refillable electrodes are TRIS compatible and have an open junction that does not clog.

Double junction electrodes are recommended for samples containing organic compounds, proteins, heavy metals and other compounds that interact with silver.

Single junction electrodes provide a reliable option for routine pH measurement.

**Top performance for QC and research**



**ROSS Ultra® combination pH electrode with extended life**

- For precise pH determinations
- General purpose, high performance

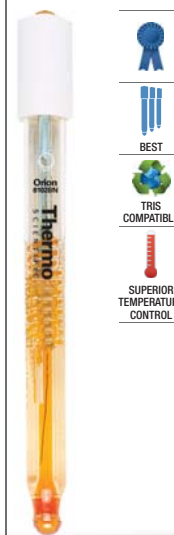
**Precise yet durable, for QC and research**



**ROSS Ultra® combination pH electrode with rugged bulb, extended life**

- Toughened bulb for rugged lab use

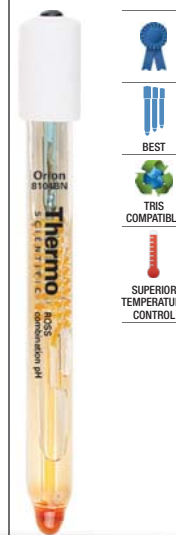
**For precise and reproducible pH determinations**



**ROSS® combination pH electrode**

- General purpose, high performance
- For QC and research applications

**Durable, for precise pH analysis**



**ROSS® combination pH electrode with glass body, rugged bulb**

- Toughened bulb for rugged lab use
- For QC and research applications

| Cat. No.                                    | 8102BNUWP               | 8104BNUWP               | 8102BN<br>8102SC        | 8104BN<br>8104SC        |
|---|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>pH Range</b>                             | 0-14                    | 0-14                    | 0-14                    | 0-14                    |
| <b>pH Precision</b>                         | 0.01                    | 0.01                    | 0.01                    | 0.01                    |
| <b>Temp. Range</b>                          | 0-100 °C                | 0-100 °C                | 0-100 °C                | 0-100 °C                |
| <b>Internal Reference</b>                   | ROSS                    | ROSS                    | ROSS                    | ROSS                    |
| <b>Junction</b>                             | Ceramic                 | Ceramic                 | Ceramic                 | Ceramic                 |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)        | 3 M KCl (810007)        | 3 M KCl (810007)        | 3 M KCl (810007)        |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm |
| <b>Connector Type</b>                       | BNC Waterproof          | BNC Waterproof          | BNC Screw Cap           | BNC Screw Cap           |

| Cat. No.  | Recommended Accessories               |
|-----------|---------------------------------------|
| 910001    | Ag/AgCl storage solution              |
| 900011    | Ag/AgCl fill solution                 |
| 910008-WA | 3 M KCl double junction fill solution |

| Cat. No. | Recommended Accessories |
|----------|-------------------------|
| 810001   | ROSS storage solution   |
| 810007   | ROSS fill solution      |





**For accurate pH analysis and titrations**



- BEST
- TRIS COMPATIBLE
- SUPERIOR TEMPERATURE CONTROL

**ROSS® combination pH electrode with 14/15 standard taper**

- For titrators or vessels that require a standard taper joint

**Accurate and reliable**



- BETTER
- TRIS COMPATIBLE

**Double Junction combination pH electrode**

- General purpose
- Easy-to-clean design

**General purpose for everyday use**



- BETTER
- BETTER

**Combination pH electrode**

- For routine or research applications

**Durable and reliable**

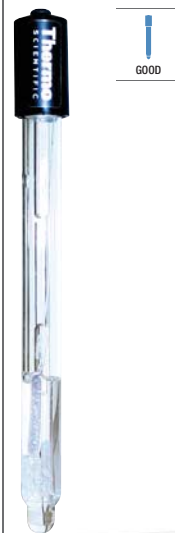


- BETTER
- BETTER

**Combination pH electrode with rugged bulb**

- Toughened bulb for rugged lab use

**General purpose and reliable**



- GOOD

**Combination pH electrode**

- General purpose
- Easy-to-clean design

| 8162SC                  | 9102DJWP                | 9102BNWP<br>9102SC          | 9104BNWP<br>9104SC          | 9142BN                      |
|-------------------------|-------------------------|-----------------------------|-----------------------------|-----------------------------|
| 0-14                    | 0-14                    | 0-14                        | 0-14                        | 0-14                        |
| 0.01                    | 0.02                    | 0.02                        | 0.02                        | 0.1                         |
| 0-100 °C                | 0-60 °C                 | 0-90 °C                     | 0-90 °C                     | 0-90 °C                     |
| ROSS                    | Ag/AgCl Double junction | Ag/AgCl                     | Ag/AgCl                     | Ag/AgCl                     |
| Sleeve                  | Ceramic                 | Ceramic                     | Ceramic                     | Ceramic                     |
| 3 M KCl (810007)        | 3 M KCl (910008-WA)     | 4 M KCl w/ Ag/AgCl (900011) | 4 M KCl w/ Ag/AgCl (900011) | 4 M KCl w/ Ag/AgCl (900011) |
| L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm     | L - 120 mm<br>D - 12 mm     | L - 120 mm<br>D - 12 mm     |
| Screw Cap               | BNC Waterproof          | BNC Waterproof Screw Cap    | BNC Waterproof Screw Cap    | BNC                         |



**Key Information**

All cap diameters are 16 mm  
All cable lengths are 1 meter



# Thermo Scientific Orion Epoxy Refillable pH Electrodes

## Rugged Epoxy Body Prevents Breakage

Epoxy body electrodes are ideal for field measurements or situations where they will be exposed to rugged handling. The electrode body surrounds the glass pH bulb providing further protection.

ROSS Ultra and ROSS electrodes exhibit unmatched accuracy and rapid response to extreme temperature variations. All are TRIS compatible. The ROSS Ultra electrode has an unprecedented 2 year warranty.

Green electrodes are the first lab electrode to contain no lead, mercury or other hazardous substances and are completely ROHS compliant. They are available in single or double junction designs.

Silver chloride epoxy electrodes provide excellent response and performance in routine samples.

**Top performance – precise pH analysis with durability**



**ROSS Ultra® combination pH electrode with epoxy body**

- Top accuracy and rapid response to temperature extremes
- General purpose, high performance
- Extended life

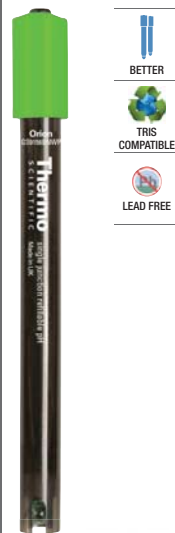
**Durable for precise pH applications**



**ROSS® combination pH electrode with epoxy body**

- Top accuracy and rapid response to temperature extremes
- General purpose, high performance

**Refillable, double junction**



**Green combination double junction refillable pH electrode with epoxy body**

- Ideal for routine or research applications
- Use in dirty water or TRIS, sulfide and protein samples
- Contains no lead

**Refillable, rugged epoxy body**



**Green combination refillable pH electrode with epoxy body**

- Ideal for routine or research applications
- Contains no lead

**General purpose and reliable**



**Combination pH electrode with epoxy body**

- For routine or research applications
- Reliable and durable

| Cat. No.                                    | 8156BNUWP               | 815600<br>8155SC        | GD9156BNWP              | GS9156BNWP                  | 9156BNWP<br>9156SC          |
|---|-------------------------|-------------------------|-------------------------|-----------------------------|-----------------------------|
| <b>pH Range</b>                             | 0-14                    | 0-14                    | 0-14                    | 0-14                        | 0-14                        |
| <b>pH Precision</b>                         | 0.01                    | 0.01                    | 0.02                    | 0.02                        | 0.02                        |
| <b>Temp. Range</b>                          | 0-100 °C                | 0-100 °C                | 0-90 °C                 | 0-90 °C                     | 0-90 °C                     |
| <b>Temp. Accuracy</b>                       | –                       | –                       | –                       | –                           | –                           |
| <b>Internal Reference</b>                   | ROSS                    | ROSS                    | Ag/AgCl Double junction | Ag/AgCl                     | Ag/AgCl                     |
| <b>Junction</b>                             | Glass fiber             | Glass fiber             | Glass fiber             | Glass fiber                 | Glass fiber                 |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)        | 3 M KCl (810007)        | 3 M KCl (910008-WA)     | 4 M KCl w/ Ag/AgCl (900011) | 4 M KCl w/ Ag/AgCl (900011) |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm     | L - 120 mm<br>D - 12 mm     |
| <b>Connector Type</b>                       | BNC Waterproof          | BNC Screw Cap           | BNC Waterproof          | BNC Waterproof              | BNC Waterproof Screw Cap    |

| Cat. No.  | Recommended Accessories              |
|-----------|--------------------------------------|
| 900011    | Ag/AgCl fill solution                |
| 810007    | ROSS fill solution                   |
| 910008-WA | 3M KCl double junction fill solution |





# Thermo Scientific Orion Micro pH Electrodes

## Delicate Electrode for Small Volumes, Fits 384 Microwell Plates

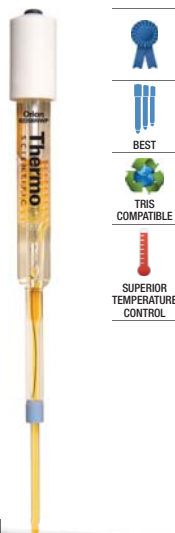
Micro electrodes are designed to measure small volumes down to 0.5  $\mu\text{L}$ . These are extremely delicate electrodes because of their size and should be treated as such. The small stem and bulb diameter allow the electrode to be inserted into small devices such as 384 microwell plates. There are a variety to choose from based on your measurement needs.

The ROSS 8220BNWP micro electrode provides the best accuracy and response time of the micro electrodes. It can be used in biological samples. The 8220BNWP is more durable than the silver chloride electrodes.

Silver chloride micro electrodes are single junction electrodes. They are available to measure samples as small as 0.5  $\mu\text{L}$ , for use in NMR tubes and available with a stainless steel needle tip over the glass stem and bulb.

The double junction micro electrode is for moderate size samples. The double junction design is good for use when measuring TRIS samples, proteins, sulfides or biologicals.

**Accurate in extremely small samples**



**PerpHecT<sup>®</sup> ROSS<sup>®</sup> combination pH electrode with glass body, micro**

- Measures samples as small as 15  $\mu\text{L}$  in 384 well plates
- Minimum depth of immersion is 4.5 mm
- Durable tip design

**Measure samples as small as 0.5  $\mu\text{L}$**



**Micro combination pH electrode with glass body, small tip**

- Designed for gels and small sample volumes
- Measure samples as small as 0.5  $\mu\text{L}$

**For use in NMR tubes**



**Micro combination pH electrode with glass body, long length**

- Ideal for measurements in extremely small vessels

**For piercing septa**



**Micro combination pH electrode with needle tip**

- 16 gauge stainless steel bevel tip

**For samples with size limitations**



**Double Junction combination pH electrode with glass body, semi-micro tip**

- Measure samples as small as 0.2 mL
- Easy-to-clean refillable design

| Cat. No.                                    | 8220BNWP                         | 9810BN                             | 9826BN                              | 9863BN                             | 9110DJWP                           |
|---|----------------------------------|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|
| <b>pH Range</b>                             | 0-14                             | 0-14                               | 0-14                                | 0-14                               | 0-14                               |
| <b>pH Precision</b>                         | 0.01                             | 0.02                               | 0.02                                | 0.02                               | 0.02                               |
| <b>Temp. Range</b>                          | 0-100 °C                         | 0-80 °C                            | 0-80 °C                             | 0-80 °C                            | 0-60 °C                            |
| <b>Temp. Accuracy</b>                       | ±0.5 °C                          | –                                  | –                                   | –                                  | –                                  |
| <b>Internal Reference</b>                   | ROSS                             | Ag/AgCl                            | Ag/AgCl                             | Ag/AgCl                            | Ag/AgCl Double junction            |
| <b>Junction</b>                             | Sleeve                           | Ceramic                            | Ceramic                             | Ceramic                            | Ceramic                            |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)                 | 4 M KCl w/ Ag/AgCl (900011)        | 4 M KCl w/ Ag/AgCl (900011)         | 4 M KCl w/ Ag/AgCl (900011)        | 3 M KCl (910008-WA)                |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 155 mm<br>T - 3 mm x 40 mm L | L - 120 mm<br>T - 1.3 mm x 37 mm L | L - 228 mm<br>T - 2.5 mm x 2.5 mm L | L - 137 mm<br>T - 1.7 mm x 40 mm L | L - 150 mm<br>T - 4.5 mm x 90 mm L |
| <b>Depth of Immersion</b>                   | 4.5 mm                           | 1 mm                               | 2 mm                                | 3 mm                               | –                                  |
| <b>Connector Type</b>                       | BNC Waterproof                   | BNC                                | BNC                                 | BNC                                | BNC Waterproof                     |



### Key Information

All cap diameters are 16 mm at bottom of cap except 9810BN, 9826BN & 9863BN  
All cable lengths are 1 meter



## Thermo Scientific Orion Glass Semi Micro pH Electrodes

Measures Samples As Small As 0.2 mL. Fits Test Tubes and Small Containers

Glass body semi-micro pH electrodes provide superior chemical resistance and can withstand high temperatures extremes. There are a variety of options to choose from.

ROSS Ultra and ROSS semi-micro pH electrodes provide optimum accuracy and unmatched response in samples of varying temperatures. They are available in chemical resistant glass bodies. All ROSS electrodes are TRIS compatible.

AquaPro semi-micro electrodes have a clog free open junction and are TRIS compatible.

Silver chloride semi-micro electrodes are durable and provide reliable and accurate measurements of routine samples.

**Ideal for QC samples with size limitations**



**ROSS Ultra® combination pH electrode with glass body, semi-micro tip**

- Extended life
- TRIS compatible
- Fast response at temperature extremes

**Fast, reliable results in small samples**



**ROSS® combination pH electrode with glass body, semi-micro tip**

- TRIS compatible
- Fast response at temperature extremes

**Fast response in small samples**



**AquaPro combination pH electrode with low maintenance polymer, glass body, semi-micro tip**

- TRIS compatible
- Open junction prevents clogging

**For samples with size constraints**



**Combination pH electrode with glass body, semi-micro tip**

- For routine or research applications

| Cat. No.                                    | 8103BNUWP                        | 8103BN<br>8103SC                 | 9103APWP                            | 9103BNWP<br>9103SC                  |
|---|----------------------------------|----------------------------------|-------------------------------------|-------------------------------------|
| <b>pH Range</b>                             | 0-14                             | 0-14                             | 0-14                                | 0-14                                |
| <b>pH Precision</b>                         | 0.01                             | 0.01                             | 0.02                                | 0.02                                |
| <b>Temp. Range</b>                          | 0-100 °C                         | 0-100 °C                         | 0-60 °C                             | 0-90 °C                             |
| <b>Internal Reference</b>                   | ROSS                             | ROSS                             | Ag/AgCl<br>Double junction          | Ag/AgCl                             |
| <b>Junction</b>                             | Ceramic                          | Ceramic                          | Open                                | Ceramic                             |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)                 | 3 M KCl (810007)                 | -                                   | 4 M KCl w/ Ag/AgCl (900011)         |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 165 mm<br>T - 6 mm x 95 mm L | L - 165 mm<br>D - 6 mm x 95 mm L | L - 165 mm<br>T - 6.5 mm x 100 mm L | L - 165 mm<br>T - 6.5 mm x 100 mm L |
| <b>Connector Type</b>                       | BNC Waterproof                   | BNC<br>Screw Cap                 | BNC Waterproof                      | BNC Waterproof<br>Screw Cap         |

| Cat. No. | Recommended Accessories    |
|----------|----------------------------|
| 910001   | Electrode storage solution |
| 900011   | Ag/AgCl fill solution      |
| 810001   | ROSS storage solution      |
| 810007   | ROSS fill solution         |



Screw Cap



BNC Waterproof



BNC

### Key Information

All cap diameters are 16 mm  
All cable lengths are 1 meter















# Thermo Scientific Orion Epoxy Semi Micro pH Electrodes

Rugged Body for Small Samples or Narrow Containers

Epoxy body semi-micro pH electrodes provide a rugged design. They are available in double junction or single junction designs as well as refillable or low-maintenance options.

ROSS electrodes offer optimum accuracy and temperature response. AquaPro electrodes provide maintenance-free use. Silver chloride electrodes are for routine measurements.

|  | For difficult samples with size limitations  | For aqueous samples with size constraints   | Dependable results in small samples   | Fast response in small samples   | For everyday use in small samples  | For everyday use in tall containers  |
|--|--|---|---|--|--|--|
|  |   |    |    |                          |   |       |
|  |   |    |    |                         |   |       |
|  | <b>ROSS® Sure-Flow® combination pH electrode with epoxy body, semi-micro tip</b>   | <b>ROSS Ultra® combination pH electrode with epoxy body, semi-micro tip</b>   | <b>ROSS® combination pH electrode with epoxy body, semi-micro tip</b>   | <b>AquaPro combination pH electrode with low maintenance polymer, epoxy body, semi-micro tip</b>           | <b>Combination pH electrode with epoxy body, low maintenance gel, semi-micro tip</b> | <b>Combination pH electrode with epoxy body, low maintenance gel, flask length</b>       |
|  | <ul style="list-style-type: none"> <li>Sure-Flow junction prevents clogging</li> <li>Measure samples as small as 0.2 mL</li> </ul> | <ul style="list-style-type: none"> <li>Measures samples as small as 0.2 mL</li> <li>Epoxy body for ruggedness and durability</li> </ul> | <ul style="list-style-type: none"> <li>Epoxy body for ruggedness and durability</li> <li>Measures samples as small as 0.2 mL</li> </ul> | <ul style="list-style-type: none"> <li>TRIS compatible</li> <li>Open junction prevents clogging</li> </ul> | <ul style="list-style-type: none"> <li>Measure samples as small as 0.2 mL</li> </ul> | <ul style="list-style-type: none"> <li>Designed for use in long-necked flasks</li> </ul> |

| Cat. No.                                    | 8175BNWP                         | 8115BNUWP                        | 8115BN<br>8115SC                 | 9115APWP                         | 911600                 | 912600                 |
|---|----------------------------------|----------------------------------|----------------------------------|----------------------------------|------------------------|------------------------|
| <b>pH Range</b>                             | 0-14                             | 0-14                             | 0-14                             | 0-14                             | 0-12                   | 0-12                   |
| <b>pH Precision</b>                         | 0.01                             | 0.01                             | 0.01                             | 0.02                             | 0.1                    | 0.1                    |
| <b>Temp. Range</b>                          | 0-100 °C                         | 0-100 °C                         | 0-100 °C                         | 0-60 °C                          | 0-80 °C                | 0-80 °C                |
| <b>Internal Reference</b>                   | ROSS                             | ROSS                             | ROSS                             | Ag/AgCl Double junction          | Ag/AgCl                | Ag/AgCl                |
| <b>Junction</b>                             | Sure-Flow                        | Glass fiber                      | Glass fiber                      | Open                             | Wick                   | Wick                   |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)                 | 3 M KCl (810007)                 | 3 M KCl (810007)                 | -                                | -                      | -                      |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 165 mm<br>T - 8 mm x 95 mm L | L - 165 mm<br>T - 8 mm x 95 mm L | L - 165 mm<br>T - 8 mm x 95 mm L | L - 160 mm<br>T - 8 mm x 90 mm L | L - 145 mm<br>D - 6 mm | L - 305 mm<br>D - 8 mm |
| <b>Connector Type</b>                       | BNC Waterproof                   | BNC Waterproof                   | BNC Screw Cap                    | BNC Waterproof                   | BNC                    | BNC                    |



**Key Information**  
 All cap diameters are 16 mm except 911600  
 All cable lengths are 1 meter



## Thermo Scientific Orion Low Maintenance pH Electrodes

Never Requires Fill Solution

Low maintenance pH electrodes are easy to use and require minimal maintenance. Since the reference chamber is sealed, you never need to replace fill solution or clean and rinse the reference chamber. You may choose from many styles such as AquaPro, Green electrodes, double junction or silver chloride electrodes to suit your measurement needs.

AquaPro low maintenance pH electrodes offer open junctions that do not clog. Choose between chemical resistant glass bodies or durable epoxy bodies. All AquaPro electrodes are TRIS compatible.

Green electrodes contain no hazardous substances such as mercury or lead and are ROHS compliant.

Double junction electrodes are TRIS compatible and you do not have to worry about interfering substances.

Silver chloride electrodes offer low maintenance as well as reliable measurements for everyday use.

### Reliable and accurate



**AquaPro combination pH electrode with low maintenance polymer, glass body**

- General purpose, high performance

### Precise and durable



**AquaPro combination pH electrode with low maintenance polymer, glass body, rugged bulb**

- Toughened bulb for rugged lab use

### Rugged and accurate



**AquaPro combination pH electrode with low maintenance polymer, epoxy body**

- General purpose, high performance

### Low maintenance, double junction



**Green combination double junction pH electrode, gel with epoxy body**

- Ideal for education, plant or field use
- Use in dirty water or TRIS, sulfide and protein samples
- Contains no lead

| Cat. No.                                    | 9102AP                  | 9104APWP                | 9156APWP                | GD9106BNWP              |
|---|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>pH Range</b>                             | 0-14                    | 0-14                    | 0-14                    | 0-14                    |
| <b>pH Precision</b>                         | 0.02                    | 0.02                    | 0.02                    | 0.02                    |
| <b>Temp. Range</b>                          | 0-60 °C                 | 0-60 °C                 | 0-60 °C                 | 0-90 °C                 |
| <b>Internal Reference</b>                   | Ag/AgCl Double junction | Ag/AgCl Double junction | Ag/AgCl Double junction | Ag/AgCl Double junction |
| <b>Junction</b>                             | Open                    | Open                    | Open                    | Glass capillary         |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm |
| <b>Connector Type</b>                       | BNC                     | BNC Waterproof          | BNC Waterproof          | BNC Waterproof          |

| Cat. No. | Recommended Accessories    |
|----------|----------------------------|
| 910001   | Electrode storage solution |
| 910199   | All-in-one pH buffer kit   |



| <p><b>Low maintenance, rugged epoxy body</b></p>  | <p><b>Durable and low maintenance</b></p>   | <p><b>For rugged, everyday use</b></p>  | <p><b>Reliable every day use</b></p>  |
|---|---|---|---|
|  <p>BETTER</p> <p>LEAD FREE</p>   |  <p>BETTER</p> <p>TRIS COMPATIBLE</p>  |  <p>GOOD</p>   |  <p>GOOD</p>   |
| <p><b>Green combination pH electrode, gel with epoxy body</b></p> <ul style="list-style-type: none"> <li>• Ideal for education, plant or field use</li> <li>• Contains no lead</li> </ul> | <p><b>Double Junction combination pH electrode with epoxy body, low maintenance gel</b></p> <ul style="list-style-type: none"> <li>• Low maintenance gel with durable epoxy body</li> </ul> | <p><b>Combination pH electrode with epoxy body, low maintenance gel</b></p> <ul style="list-style-type: none"> <li>• Ideal for field, plant, or educational applications</li> </ul> | <p><b>Combination pH electrode with epoxy body, low maintenance gel</b></p> <ul style="list-style-type: none"> <li>• General purpose use</li> <li>• Removable bulb guard makes cleaning easy</li> </ul> |
| <p><b>GS9106BNWP</b></p> <p>0-14</p> <p>0.05</p> <p>0-90 °C</p> <p>Ag/AgCl</p> <p>Glass capillary</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC Waterproof</p>                            | <p><b>9156DJWP</b></p> <p>0-14</p> <p>0.02</p> <p>0-60 °C</p> <p>Ag/AgCl Double junction</p> <p>Wick</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC Waterproof</p>                           | <p><b>9106BNWP</b></p> <p>0-14</p> <p>0.05</p> <p>0-80 °C</p> <p>Ag/AgCl</p> <p>Wick</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC Waterproof</p>                                   | <p><b>9146BN</b></p> <p>0-14</p> <p>0.1</p> <p>0-80 °C</p> <p>Ag/AgCl</p> <p>Wick</p> <p>L - 120 mm</p> <p>D - 12 mm</p> <p>BNC</p>   |



**Key Information**

All cap diameters are 16 mm

All cable lengths are 1 meter



## Thermo Scientific Orion Flat Surface pH Electrodes

Measure Moist Surfaces Such As Agar Gel Plates, Meats and Cheese

Flat surface electrodes are epoxy body electrodes with a flat pH bulb that allow you to measure moist solid samples or small volumes. They can be used on samples such as meats, cheese or in agar gel plates. Flat surface pH electrodes are available in single or double junction designs allowing you to measure samples such as TRIS buffers or samples containing protein, sulfides or other compounds that react with silver. You may also choose from refillable or low maintenance designs.

Thermo Scientific Orion ROSS Ultra and ROSS flat surface electrodes provide optimum accuracy and stability while being TRIS compatible. The ROSS Ultra flat surface electrode has a 2 year warranty.

The AquaPro flat surface electrode is TRIS compatible and has an open junction that does not clog. The 9135APWP AquaPro flat surface electrode is a low maintenance model never requiring fill solution.

The silver chloride 913600 flat surface electrode is a low maintenance electrode that is ideal for routine measurements.

**Ideal for soft solid and semi-solid samples**



**ROSS Ultra® combination pH electrode with epoxy body, flat surface**

- Extended life and 2 year warranty
- Rapid response to temperature extremes

**For soft solid and semi-solid samples**



**ROSS® combination pH electrode with epoxy body, flat surface**

- Premium performance
- Rapid response to temperature extremes

**For soft solids and semi-solids**



**AquaPro combination pH electrode with low maintenance polymer, epoxy body, flat surface**

- Clog free junction for tough samples

**For solids and semi-solids**



**Combination pH electrode with epoxy body, low maintenance gel, flat surface**

- For routine flat surface measurements

| Cat. No.                                    | 8135BNUWP               | 8135BN<br>8135SC        | 9135APWP                | 913600                  |
|---|-------------------------|-------------------------|-------------------------|-------------------------|
| <b>pH Range</b>                             | 0-14                    | 0-14                    | 0-14                    | 0-12                    |
| <b>pH Precision</b>                         | 0.01                    | 0.01                    | 0.02                    | 0.1                     |
| <b>Temp. Range</b>                          | 0-100 °C                | 0-100 °C                | 0-60 °C                 | 0-80 °C                 |
| <b>Internal Reference</b>                   | ROSS                    | ROSS                    | Ag/AgCl Double junction | Ag/AgCl                 |
| <b>Junction</b>                             | Glass fiber             | Glass fiber             | Open                    | Wick                    |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)        | 3 M KCl (810007)        | -                       | -                       |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 110 mm<br>D - 12 mm |
| <b>Connector Type</b>                       | BNC Waterproof          | BNC Screw Cap           | BNC Waterproof          | BNC                     |

| Cat. No.  | Recommended Accessories    |
|-----------|----------------------------|
| 910001    | Electrode storage solution |
| 900011    | Ag/AgCl fill solution      |
| 810007    | ROSS fill solution         |
| 910008-WA | 3 M KCl fill solution      |



Screw Cap



BNC Waterproof



BNC

**Key Information**

All cable lengths are 1 meter





# Thermo Scientific Orion Spear Tip pH Electrodes

For Piercing Fruits, Cheese and Meats

Spear tip pH electrodes can be used for piercing soft samples like cheese or fruit or cutting through tougher samples such as meat. All have refillable designs. They are available in single junction or double junction designs which can be used with TRIS samples, proteins or sulfides.

The ROSS spear tip electrode offers the proven accuracy and response that ROSS electrodes are known for and is a double junction electrode. It is suited for semi-solid samples.

The 9163SC is suited for routine measurements and is for use in semi-solid samples.

The KNIpHE electrode has a glass electrode that is encased in a stainless steel housing with a cutting blade at the tip. It is used for tough samples such as meat. It has a double junction design.

The 9162BNWP can be used for soft samples or routine clean water measurements. It has a single junction design.

**For piercing semi-solid samples**



**ROSS® combination pH electrode with glass body, spear tip**

- For cheese, meat, and fruit samples
- Measure samples as small as 100 µL
- Double junction for TRIS samples

**For piercing soft samples**



**Combination pH electrode, glass body, spear tip**

- For cheese, meat, and fruit samples
- Measure samples as small as 100 µL

**For meat, cheese and sludge samples**



**KNIpHE® Double Junction combination pH electrode with stainless steel cutting blade**

- For meat, cheese and sludge where glass alone may break
- Replacement electrode Cat. No. 9121APWP
- Replacement blade Cat. No. 712001
- Replacement sheath Cat. No. 712002

**Rugged with an easy-to-clean bulb**



**Low resistance combination pH electrode with glass body, rugged bulb**

- For routine or clean water measurements
- For soft samples

| Cat. No.                                    | 8163BNWP<br>8163SC                 | 9163SC                            | 9120APWP                   | 9162BNWP                    |
|---|------------------------------------|-----------------------------------|----------------------------|-----------------------------|
| <b>pH Range</b>                             | 0-14                               | 0-14                              | 0-14                       | 0-14                        |
| <b>pH Precision</b>                         | 0.01                               | 0.02                              | 0.02                       | 0.02                        |
| <b>Temp. Range</b>                          | 0-100 °C                           | 0-90 °C                           | 0-60 °C                    | 0-90 °C                     |
| <b>Internal Reference</b>                   | ROSS                               | Ag/AgCl                           | Ag/AgCl<br>Double junction | Ag/AgCl                     |
| <b>Junction</b>                             | Ceramic                            | Ceramic                           | Ceramic                    | Ceramic                     |
| <b>Fill Solution (Cat. No.)</b>             | 3 M KCl (810007)                   | 4 M KCl w/ Ag/AgCl (900011)       | 3 M KCl (910008-WA)        | 4 M KCl w/ Ag/AgCl (900011) |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 110 mm<br>T - 4.5 mm x 20 mm L | L - 95 mm<br>D - 6.5 mm x 25 mm L | L - 215 mm<br>D - 16 mm    | L - 120 mm<br>D - 12 mm     |
| <b>Connector Type</b>                       | BNC Waterproof<br>Screw Cap        | Screw Cap                         | BNC Waterproof             | BNC Waterproof              |

| Cat. No. | Recommended Accessories |
|----------|-------------------------|
| 900011   | Ag/AgCl fill solution   |
| 810007   | ROSS fill solution      |
| 910008   | 3M KCl fill solution    |



Screw Cap



BNC Waterproof

### Key Information

All cap diameters are 16 mm  
All cable lengths are 1 meter



## Thermo Scientific Orion pH Half Cell and Reference Half Cell Electrodes

pH half cells require the use of a reference half cell electrode.

Reference half cells are for use with either a pH half cell sensing electrode or an ISE half cell reference electrode. They are available as single or double reference designs. Clog free Sure-flow junctions are also available extending the life of your electrode.

Ross half cells should be paired together. 900100 and 900200 are silver chloride references for pH and ISE electrodes.

**Accurate, ROSS rapid response in a half-cell design**



**ROSS® pH half-cell with glass body**

- Use with 800300 ROSS Sure-Flow or 800500U ROSS Ultra reference electrodes

**Accurate results in a half-cell**



**pH half-cell with glass body**

- Use with 900100 single junction or 900200 double junctions reference electrodes

**Top performance and long life**



**ROSS Ultra® reference half-cell with glass body**

- Use with 8101BNWP or 8101SC ROSS pH half-cell or 8411BN ROSS sodium half-cell electrodes

**For all samples including solvents**



**ROSS® Sure-Flow® reference half-cell with glass body**

- Sure-Flow junction prevents clogging
- Use with 8101BNWP or 8101SC ROSS pH half-cell or 8411BN ROSS sodium half-cell electrodes

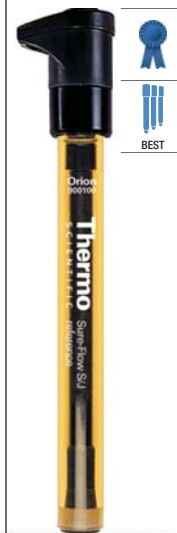
**For use with ISE half-cell or pH electrodes**



**Double Junction Sure-Flow® reference half-cell with epoxy body**

- Sure-Flow junction prevents clogging
- Double junction allows a variety of filling solutions to be used

**For routine pH and many ISE measurements**



**Single Junction Sure-Flow® reference half-cell with epoxy body**

- Use with 9101BN and 9101SC pH half-cell electrodes
- Compatible with several ISEs

|   | 8101BNWP<br>8101SC       | 9101BN<br>9101SC        | 800500U                 | 800300                  | 900200   | 900100                                       |
|---|--------------------------|-------------------------|-------------------------|-------------------------|--|--|
| <b>Cat. No.</b>                             | 8101BNWP<br>8101SC       | 9101BN<br>9101SC        | 800500U                 | 800300                  | 900200   | 900100                                       |
| <b>pH Range</b>                             | 0-14                     | 0-14                    | 0-14                    | 0-14                    | 0-14   | 0-14   |
| <b>pH Precision</b>                         | 0.01                     | 0.02                    | –                       | –                       | –  | –  |
| <b>Temp. Range</b>                          | 0-100 °C                 | 0-90 °C                 | 0-100 °C                | 0-100 °C                | 0-100 °C   | 0-100 °C                                     |
| <b>Internal Reference</b>                   | ROSS                     | Ag/AgCl                 | ROSS                    | ROSS                    | Ag/AgCl Double junction                          | Ag/AgCl                                      |
| <b>Junction</b>                             | –                        | –                       | Ceramic                 | Sure-Flow               | Sure-Flow  | Sure-Flow                                    |
| <b>Fill Solution (Cat. No.)</b>             | –                        | –                       | 3 M KCl (810007)        | 3 M KCl (810007)        | Equitransferent solution (900002) outer (900003) | Equitransferent solution w/ Ag/AgCl (900001) |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 120 mm<br>D - 12 mm  | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 120 mm<br>D - 12 mm | L - 110 mm<br>D - 13 mm                          | L - 110 mm<br>D - 13 mm                      |
| <b>Connector Type</b>                       | BNC Waterproof Screw Cap | BNC Screw Cap           | Pin Tip                 | Pin Tip                 | Pin Tip  | Pin Tip                                      |

| Cat. No. | Recommended Accessories                       |
|----------|---|
| 810007   | ROSS fill solution                            |
| 900001   | Single junction reference fill solution       |
| 900002   | Double junction reference inner fill solution |
| 900003   | Double junction reference outer fill solution |



**Key Information**

All cap diameters are 16 mm at bottom of cap  
All cable lengths are 1 meter



# Thermo Scientific Orion ATC Probes

## Accurate Temperature Measurement

ATC probes will measure the temperature of your sample quickly and accurately. They are extremely durable. There are a variety of options available to you to use depending on your application. Choose from a micro ATC probe, stainless steel, glass or epoxy body probe. The connector must be compatible with the meter you are using.

**Fastest temperature response**



**Micro ATC probe with stainless steel tip and epoxy body**

- For critical temperature monitoring
- Measures samples as small as 10 µL
- Minimum depth of immersion is 3 mm

**Rugged stainless steel**



**ATC probe with stainless steel body**

- Extremely durable body
- For field, plant, and food applications

**Solvent-resistant glass**



**ATC probe with glass body**

- For solutions that contain organic solvents

**Durable epoxy**



**ATC probe with epoxy body**

- General purpose
- For aqueous samples, intermittent use in methanol or ethanol

**Small diameter rugged stainless steel**



**ATC probe with stainless steel body**

- Extremely durable body
- For field, plant, and food applications
- For use with Russell meters

| Cat. No.  | 928007MD (Star)                              | 927007MD (Star)<br>917007 (A+ Series)<br>927007 (PerpHecT)       | 927006MD (Star)<br>917006 (A+ Series)<br>927006 (PerpHecT)       | 927005MD (Star)<br>917005 (A+ Series)<br>927005 (PerpHecT)<br>917001 (Older Orion Meters)                    | 917004                                  |
|---|--|--|--|--|---|
| <b>Temp. Range</b>                              | 0-100 °C                                     | 0-100 °C   | 0-100 °C   | 0-80 °C  | 0-100 °C                                |
| <b>Temp. Accuracy</b>                           | ±1 °C  | ±2 °C  | ±2 °C  | ±2 °C  | ±2 °C                                   |
| <b>Dimension<br/>D (Dia) L (Length) T (Tip)</b> | L - 117 mm<br>D - 5 mm<br>D - 1 mm x 38 mm L | L - 120 mm<br>D - 6 mm   | L - 120 mm<br>D - 8 mm   | L - 120 mm<br>D - 6 mm   | L - 120 mm<br>D - 3 mm                  |
| <b>Connector Type</b>                           | MiniDIN for Star                             | MiniDIN (Star)<br>8 Pin DIN (A+ Series)†<br>Phono Tip (PerpHecT) | MiniDIN (Star)<br>8 Pin DIN (A+ Series)†<br>Phono Tip (PerpHecT) | MiniDIN (Star)<br>8 Pin DIN (A+ Series)†<br>Phono Tip (PerpHecT)<br>Dual Banana Plug<br>(Older Orion Meters) | 2.5 mm Phono Jack<br>for Russell meters |



2.5 mm Phono Tip



Dual Banana Plug



Phono Tip (PerpHecT)



MiniDIN (Star)



8 Pin DIN (A Series)

### Key Information

All cap diameters are 16 mm except 928007MD  
All cable lengths are 1 meter



## Thermo Scientific Orion Redox/ORP and ORP Triode Electrodes

Reliable Redox Measurements

ORP measurements are easily made with your choice of ORP electrodes. Use our reliable ORP standard and compare your results to the Standard Hydrogen Electrode.

The 9678BNWP is a durable epoxy body electrode with a non-clog Sure-Flow junction. The 9778BNWP offers a chemical resistant glass body. ORP triodes have a durable epoxy body and can measure temperature also. They are available in refillable design or low-maintenance gel filled styles.

**Durable and clog-free**



**Sure-Flow<sup>®</sup> combination redox/ORP electrode with epoxy body**

- For use in water, wastewater, metal plating, and biotech samples
- Sure-Flow junction prevents clogging

**Solvent-resistant glass body**



**Combination redox/ORP electrode with glass body**

- For use in water, wastewater, metal plating and organic solvent samples

**Easy-to-clean with built-in ATC**



**ORP/ATC Triode™ with epoxy body, refillable**

- For use in water and wastewater
- Epoxy body for ruggedness and durability

**Low maintenance with built-in ATC**



**ORP/ATC Triode™ with epoxy body, low maintenance gel**

- For use in water and wastewater
- Epoxy body for ruggedness and durability

|   | <b>Cat. No. 9678BNWP</b>    | <b>9778BNWP</b>             | <b>9180BNMD (Star) 9180BN (A+ Series)</b>                             | <b>9179BNMD (Star) 9179BN (A+ Series)</b>                             |
|---|-----------------------------|-----------------------------|---|---|
| <b>pH Range</b>                             | –                           | –                           | –   | –   |
| <b>Temp. Range</b>                          | 0-90 °C                     | 0-100 °C                    | 0-90 °C   | 0-80 °C   |
| <b>Temp. Accuracy</b>                       | –                           | –                           | ±2.0 °C   | ±2.0 °C   |
| <b>Internal Reference</b>                   | Ag/AgCl                     | Ag/AgCl                     | Ag/AgCl   | Ag/AgCl   |
| <b>Junction</b>                             | Sure-Flow                   | Ceramic                     | Glass Fiber   | Wick  |
| <b>Fill Solution (Cat. No.)</b>             | 4 M KCl w/ Ag/AgCl (900011) | 4 M KCl w/ Ag/AgCl (900011) | 4 M KCl w/ Ag/AgCl (900011)   | –   |
| <b>Dimension D (Dia) L (Length) T (Tip)</b> | L - 110 mm<br>D - 13 mm     | L - 120 mm<br>D - 12 mm     | L - 120 mm<br>D - 12 mm   | L - 120 mm<br>D - 12 mm   |
| <b>Connector Type</b>                       | BNC Waterproof              | BNC Waterproof              | BNC Waterproof - MiniDIN (Star)<br>BNC Waterproof - 8 Pin (A+ Series) | BNC Waterproof - MiniDIN (Star)<br>BNC Waterproof - 8 Pin (A+ Series) |

| <b>Cat. No.</b> | <b>Recommended Accessories</b> |
|-----------------|--------------------------------|
| <b>900011</b>   | Ag/AgCl fill solution          |
| <b>967901</b>   | ORP standard 475 mL            |
| <b>967961</b>   | ORP standard 5 x 60 mL         |



BNC Waterproof



MiniDIN (Star)



8 Pin DIN (A Series)

**Key Information**

All cap diameters are 16 mm at bottom of cap  
All cable lengths are 1 meter



# Thermo Scientific Orion Silver Billet and Karl Fischer Electrodes

Electrodes for Titrations and Speciality Applications

The 977900 is a double platinum chemical resistant glass electrode for use with Karl Fischer titrations. It has a ground glass joint on the body to fit into titration vessels.

The 9780SC is a glass silver billet electrode used in halide titrations.

## Thermo Scientific Orion Storage Sleeve and Base

If you ever have had an electrode drop on a lab bench and break you will want to use the storage sleeve and base, 810017.

### Features and Benefits

- Protects electrode from breakage when not in use
- Covers entire glass body of standard size pH electrodes (12 x 120 mm)
- pH bulb stays conditioned when not in use
- Weighted base prevents electrode from tipping
- Sleeve can be removed from base to store in electrode holder



Storage Sleeve and Base 810017

For Karl Fischer titrations



For halide titrations



Karl Fischer double platinum electrode with glass body

- For accurate Karl Fischer titrations

Silver Billet combination electrode

- For accurate and reliable halide titrations

| Cat. No.                             | 977900                  | 9780SC                      |
|--------------------------------------|-------------------------|-----------------------------|
| pH Range                             | Endpoint Indicator      | Endpoint Indicator          |
| Temp. Range                          | 0-40 °C                 | 0-80 °C                     |
| Internal Reference                   | Platinum                | Ag/AgCl                     |
| Junction                             | -                       | Ceramic                     |
| Fill Solution (Cat. No.)             | -                       | 4 M KCl w/ Ag/AgCl (900011) |
| Dimension D (Dia) L (Length) T (Tip) | L - 120 mm<br>D - 12 mm | L - 150 mm<br>D - 12 mm     |
| Connector Type                       | Dual Pin Tip            | Screw Cap                   |



Screw Cap



Dual Pin Tip

### Key Information

Environmentally-safe mercury-free  
All cap diameters are 16 mm at bottom of cap  
All cable lengths are 1 meter



## Thermo Scientific Orion Star Stirrer Probe

Ideal for laboratory pH and ISE measurements



### Orion Star Automatic Stirrer Probe

Thermo Scientific Orion Star Stirrer probes are the answer to economical and convenient stirring.

- Use with the following Orion benchtop meters for automatic control and stirring:
  - Orion VERSA STAR
  - Orion DUAL STAR
  - Orion Star A210-series
  - Orion 3-, 4- and 5-Star/Star Plus benchtop
- Eliminates the hassles of magnetic stir plates and stir bars
- No heat transfer from stir plate
- No need to capture & wash stir bars
- No potential electrode bulb damage from stir bars
- Competitive pricing allows you to take advantage of the stirrer probe benefits at half the price of similar models
- Conveniently plugs into the back panel of the compatible benchtop meters for stirrer power, speed and control

It is so easy-to-use! Plug the stirring probe into the back panel of an Orion VERSA STAR, DUAL STAR, Star A210-series or benchtop 3-, 4- and 5- Star/Star Plus meter and place it into an electrode stand with the measuring electrode. Control the on/off function and stirring speed using the meter controls. Simply insert the stirring probe into a sample and rinse it between measurements.

### Stirring Probes with Paddles

| Cat. No. | Description                          |
|----------|--------------------------------------|
| 096019   | Orion Star Stirrer probe with paddle |
| 096021   | Replacement paddles, 3 pack          |



### Accessories

#### Orion DUAL STAR™

Pages 10-11

For easy ISE testing, pair the automatic stirrer probe with an Orion DUAL STAR meter.



# Thermo Scientific Orion Electrode Connectors and Cables

Connectors that stay dry and connected



If you ever lost an electrode because of a failed connection, you'll appreciate the Orion Star Series' proprietary waterproof BNC and MiniDIN locking connectors. Adapter cables can be used to connect Orion Star Series electrodes to a wide variety of other meters.



## Electrode Adapter Cables

| Cat. No. | Meter Input                | Electrode Connector                  | Adapter Needed                                    |
|----------|----------------------------|--------------------------------------|---|
| 090033   | BNC                        | U.S. standard                        | US standard to BNC adapter                        |
| 91CBNC   | BNC                        | Screw cap                            | Detachable cable to BNC connector                 |
| 090048   | BNC                        | Karl Fischer double pin tip          | Karl Fischer adapter                              |
| 090032   | U.S. standard              | BNC                                  | BNC to U.S. standard adapter                      |
| 91USCB   | U.S. standard              | Combination electrode with screw cap | Detachable cable to U.S. standard connector       |
| 91USHC   | U.S. standard              | Half-cell electrode with screw cap   | Detachable cable to half-cell U.S. std. connector |
| 090036   | F LEMO (Metrohm)           | BNC                                  | BNC to F LEMO adapter                             |
| 090035   | LEMO miniature (Mettler)   | BNC                                  | BNC to LEMO miniature adapter                     |
| 91CLMO   | LEMO miniature (Mettler)   | Screw cap                            | Detachable cable to LEMO connector                |
| 090034   | E DIN (Knick, Schott, WTW) | BNC                                  | BNC to E DIN adapter                              |
| 91CDIN   | E DIN (Knick, Schott, WTW) | Screw cap                            | Detachable cable to E Din connector               |
| 090037   | Radiometer no. 7           | BNC                                  | BNC to radiometer adapter                         |
| 91USRF   | 2 mm pin tip               | Screw cap                            | Detachable cable to 2.5 mm pin tip connector      |
| 91CBNT   | Other                      | Screw cap                            | Detachable cable to stripped end                  |

## Electrode Extension Cables

| Cat. No.  | Description  |
|-----------|--|
| 910026-WA | 15 ft. extension cable, pin tip connector  |
| 910027    | 15 ft. extension cable, BNC connector  |
| 910028    | 15 ft. extension cable, 8 pin DIN connector for 917005, 917006 and 917007 ATC probes |
| 910029-WA | 15 ft. extension cable, 3.5 mm phono tip connector for 927005, 927006 and 927007     |
| 910030    | 15 ft. extension cable, BNC and 3.5 mm phono tip connectors for 9207BN pH/ATC Triode |
| 910031    | 15 ft. extension cable, banana jack connector for 917001 and 917002 ATC probes       |
| 910032    | 15 ft. extension cable, 8 pin mini DIN for ATC probes for star series meters         |

## Adapter Cables (For Star Series Electrodes to Older Meters)

| Cat. No.   | Description   | Meter Capabilities   |
|------------|---|--|
| 1010050-WA | MiniDIN ATC probe to 3.5 mm phono tip meter                           | Use on 310 320, 330, 350 370, 555A 550A, 535A and 162A meters                            |
| 1010051    | MiniDIN ATC probe to 8 pin DIN meter                                  | Use on 210A+, 230A+ 250A+, 290A+ 410A+, 420A+ 520A+, 525A+ 710A+, 720A+ and 920A+ meters |
| 1010800    | MiniDIN DO probe to 8 pin waterproof DIN DO meter                     | Use on 830A 835A and 862A meters   |
| 1010801    | MiniDIN DO probe to 8 pin DIN DO meter                                | Use on 805A+, 810A+ and 850A+ meters   |
| 1010900-WA | MiniDIN conductivity probe to 8 pin waterproof DIN conductivity meter | Use on 555A 550A, 162A 135A, and 130A meters   |
| 1010901    | MiniDIN conductivity probe to 8 pin DIN conductivity meter            | Use on 150A+, 145A+ 125A+, 115A+ and 105A+ meters  |



## Thermo Scientific Orion pH Buffers and Solutions

We have the pH buffers, storage solutions, cleaning solutions, kits and pH electrode filling solutions for every application. All Orion pH buffers and standards are traceable to NIST reference materials. A wide variety of sizes are available from 15 mL single use pouches to large volume 19 L cubitainers.



### pH Buffers in 475 mL (1 Pint) Bottles

Great for standard laboratory applications and everyday use

| Cat. No.      | Description  |
|---------------|--|
| <b>810199</b> | <b>ROSS All-in-One pH Buffer Kit</b><br>475 mL each of pH 4.01, 7.00 and 10.01 buffers;<br>475 mL of ROSS pH electrode storage solution (810001);<br>60 mL of pH electrode cleaning solution;<br>and 12 mm diameter electrode storage bottle |
| <b>910199</b> | <b>Standard All-in-One pH Buffer Kit</b><br>475 mL each of pH 4.01, 7.00 and 10.01 buffers;<br>475 mL of pH electrode storage solution (910001);<br>and 12 mm diameter electrode storage bottle  |
| <b>910168</b> | pH 1.68 buffer, NIST traceable, 475 mL   |
| <b>910104</b> | pH 4.01 buffer, color coded red, NIST traceable, 475 mL  |
| <b>910105</b> | pH 5.00 buffer, color coded orange, NIST traceable, 475 mL   |
| <b>910686</b> | pH 6.86 buffer, DIN standard, NIST traceable, 475 mL   |
| <b>910107</b> | pH 7.00 buffer, color coded yellow, NIST traceable, 475 mL   |
| <b>910918</b> | pH 9.18 buffer, DIN standard, NIST traceable, 475 mL   |
| <b>910110</b> | pH 10.01 buffer, color coded blue, NIST traceable, 475 mL  |
| <b>910112</b> | pH 12.46 buffer, NIST traceable, 475 mL  |



### pH Buffers in 5 x 60 mL (5 x 2 Oz) Bottles

Perfect for field measurements, occasional pH analysis or limited lab space

| Cat. No.         | Description   |
|------------------|---|
| <b>916099</b>    | <b>All-in-One 60 mL pH Buffer Kit</b><br>60 mL each of pH 4.01, 7.00 and 10.01 buffers;<br>60 mL of pH electrode storage solution (910060);<br>and 60 mL of pH electrode cleaning solution (900024) |
| <b>9116860</b>   | pH 1.68 buffer, NIST traceable, 5 x 60 mL   |
| <b>910460</b>    | pH 4.01 buffer, color coded red, NIST traceable, 5 x 60 mL  |
| <b>916860</b>    | pH 6.86 buffer, DIN standard, NIST traceable, 5 x 60 mL   |
| <b>910760</b>    | pH 7.00 buffer, color coded yellow, NIST traceable, 5 x 60 mL   |
| <b>9191860</b>   | pH 9.18 buffer, DIN Standard, NIST traceable, 5 x 60 mL   |
| <b>911060</b>    | pH 10.01 buffer, color coded blue, NIST traceable, 5 x 60 mL  |
| <b>911260-WA</b> | pH 12.46 buffer, NIST traceable, 5 x 60 mL  |



**pH Buffers and Rinse Solution in Individual Use Pouches**  
Ideal for field measurements, pharma applications or single use buffer requirements

| Cat. No.                          | Description   |
|-----------------------------------|---|
| <b>910410-WA</b><br><b>910425</b> | <b>pH 4.01 Buffer, Color Coded Red, NIST Traceable</b><br>Individual use pouches, 10 x 15 mL<br>Individual use pouches, 25 x 15 mL    |
| <b>910710</b><br><b>910725</b>    | <b>pH 7.00 Buffer, Color Coded Yellow, NIST Traceable</b><br>Individual use pouches, 10 x 15 mL<br>Individual use pouches, 25 x 15 mL |
| <b>911010</b><br><b>911025-WA</b> | <b>pH 10.01 Buffer, Color Coded Blue, NIST Traceable</b><br>Individual use pouches, 10 x 15 mL<br>Individual use pouches, 25 x 15 mL  |
| <b>911110</b><br><b>911125</b>    | <b>pH Electrode Rinse Solution</b><br>Individual use pouches, 10 x 15 mL<br>Individual use pouches, 25 x 15 mL                        |



### pH Buffers in 19 L (5 Gallon) Cubitainers with Easy-Pour Spout

Excellent for large laboratories and multiple users

| Cat. No.      | Description  |
|---------------|--|
| <b>9104CB</b> | pH 4.01 buffer, color coded red, NIST traceable, 19 L (5 gallon) cubitainer    |
| <b>9107CB</b> | pH 7.00 buffer, color coded yellow, NIST traceable, 19 L (5 gallon) cubitainer |
| <b>9110CB</b> | pH 10.01 buffer, color coded blue, NIST traceable, 19 L (5 gallon) cubitainer  |





### pH Electrode Storage Solution and ROSS pH Electrode Storage Solution

Get the fastest, most reliable performance from your pH electrode

| Cat. No. | Description  |
|----------|--|
| 810199   | <b>ROSS All-in-One pH Buffer Kit</b><br>475 mL each of pH 4.01, 7.00 and 10.01 buffers;<br>475 mL of ROSS pH electrode storage solution (810001);<br>60 mL of pH electrode cleaning solution;<br>and 12 mm diameter electrode storage bottle |
| 910199   | <b>Standard All-in-One pH Buffer Kit</b><br>475 mL each of pH 4.01, 7.00 and 10.01 buffers;<br>475 mL of pH electrode storage solution (910001);<br>and 12 mm diameter electrode storage bottle  |
| 916099   | <b>All-in-One 60 mL pH Buffer Kit</b><br>60 mL each of pH 4.01, 7.00 and 10.01 buffers;<br>60 mL of pH electrode storage solution (910060);<br>and 60 mL of pH electrode cleaning solution (900024)  |
| 810001   | <b>ROSS pH Electrode Storage Solution</b><br>475 mL  |
| 910001   | <b>pH Electrode Storage Solution</b><br>475 mL   |
| 910060   | 5 x 60 mL  |
| 9100CB   | 19 L (5 gallon) cubitainer   |



### pH Electrode Cleaning Solutions

Specially formulated cleaning solutions for slow, dirty or clogged pH electrodes

| Cat. No.  | Description   |
|-----------|---|
| 900020    | <b>pH Electrode Cleaning Kit</b> – 30 mL of cleaning solution A and C, 60 mL of cleaning solution B and D, beaker and pipet |
| 900021-WA | pH electrode cleaning solution A for protein removal, 4 x 30 mL, beaker and pipet   |
| 900022-WA | pH electrode cleaning solution B for bacteria removal, 4 x 60 mL, beaker and pipet  |
| 900023    | pH electrode cleaning solution C for general cleaning, 4 x 30 mL, beaker and pipet  |
| 900024    | pH electrode cleaning solution D for general cleaning and oil and grease removal, 4 x 60 mL, beaker and pipet               |
| 510015    | Stain lifter solution for no cal fill solution and ORP standard stain removal, 60 mL  |



### pH Specialty Solutions and ORP Standards

| Cat. No.  | Description  |
|-----------|--|
| 700001    | <b>Pure Water Low Ionic Strength pH Test Kit</b> –<br>4 x 475 mL of pH 6.97 buffer, 2 x 475 mL of pH 4.10 buffer, 2 x 60 mL of pHISA adjuster and app note |
| 700003    | Pure water pHISA low ionic strength adjuster, 5 x 60 mL  |
| 700402    | Pure water pH 4.10 buffer B for low ionic strength pH samples, 4 x 475 mL  |
| 700702    | Pure water pH 6.97 buffer A for low ionic strength pH samples, 4 x 475 mL  |
| 700902    | Pure water pH 9.15 buffer C for low ionic strength pH samples, 4 x 475 mL  |
| 700010    | <b>Total Alkalinity Test Kit</b> – 475 mL of alkalinity reagent (700011-WA), 475 mL of alkalinity standard (700012), conversion chart and app note         |
| 700011-WA | Total alkalinity reagent refill, 4 x 475 mL  |
| 700012    | Total alkalinity standard/control refill, 475 mL   |
| 967901    | <b>ORP Standard</b> , +420 mV vs. standard hydrogen electrode (EH), +220 mV vs. Ag/AgCl electrode using 900011 fill solution, 475 mL                       |
| 967961    | <b>ORP Standard</b> , +420 mV vs. standard hydrogen electrode (EH), +220 mV vs. Ag/AgCl electrode using 900011 fill solution, 5 x 60 mL                    |



**Pure Water® pH Test Kit:** Get fast, accurate pH results in high purity waters such as well, rain, distilled/deionized, boiler feed and process. The kit includes special low ionic strength buffers and pHISA additive that increases sample ionic strength without changing the pH. For best results, a high quality pH electrode such as the ROSS Ultra 8102BNUWP is recommended (purchase separately).



**Total Alkalinity Test Kit:** A two-step direct measurement of total alkalinity and pH. Calibrate for pH, add alkalinity reagent and read total alkalinity of 0-200 ppm CaCO<sub>3</sub> from the included pH conversion chart.



## Thermo Scientific Orion Electrode Fill Solutions and Accessories



### pH Electrode and Reference Electrode Fill Solutions

Ensure the proper performance and function from your electrode by using our specially formulated fill solutions

| Cat. No.  | Description   | Use With Electrodes   |
|-----------|---|---|
| 810007    | ROSS electrode fill solution, 3 M KCl, 5 x 60 mL  | <b>ROSS Ultra, ROSS and Micro ROSS Electrodes</b><br>800300, 800500U, 8102BN, 8102BNUWP, 8103BN, 8103BNUWP, 8104BN, 8104BNUWP, 8115BN, 8115BNUWP, 8135BN, 8135BNUWP, 815600, 8156BNUWP, 8157BNU, 8157BNUMD, 8157UWMD, 8163BNWP, 8165BNWP, 8172BNWP, 8175BNWP, 8220BNWP, 8302BNUMD               |
| 900011    | Silver Chloride pH electrode fill solution, 4 M KCl with Ag/AgCl, 5 x 60 mL                               | <b>Standard, Specialty, Single Junction Refillable Green, Micro and ORP Electrodes</b><br>9102BNWP, 9103BNWP, 9104BNWP, 9156BNWP, 9157BN, 9157BNMD, 9162BNWP, 9165BNWP, 9172BNWP, 9180BN, 9180BNMD, 9678BNWP, 9778BNWP, 9780SC, 9810BN, 9826BN, 9863BN, GS9156BNWP                              |
| 900004    | Silver Chloride pH electrode (low level) fill solution, 2 M KCl with Ag/AgCl, 5 x 60 mL                   | <b>Standard, Specialty, Single Junction Refillable Green, Micro and ORP Electrodes (low ionic strength samples)</b><br>9102BNWP, 9103BNWP, 9104BNWP, 9156BNWP, 9157BN, 9157BNMD, 9162BNWP, 9165BNWP, 9172BNWP, 9180BN, 9180BNMD, 9678BNWP, 9778BNWP, 9780SC, 9810BN, 9826BN, 9863BN, GS9156BNWP |
| 910008-WA | Double junction pH electrode fill solution, 3 M KCl, 5 x 60 mL  | <b>Double Junction, Double Junction Refillable Green and KNPHE Electrodes</b><br>9102DJWP, 9110DJWP, 9120APWP, GD9156BNWP   |
| 510011    | No Cal pH electrode fill solution, 5 x 60 mL  | <b>No Cal Electrodes</b><br>5107BNMD, 5107NC  |
| 610001    | pHuture pH electrode fill solution, 5 x 60 mL   | <b>pHuture Electrodes</b>   |
| 900001    | Single junction reference electrode fill solution, equitransferent solution with Ag/AgCl, 5 x 60 mL       | <b>Single Junction Reference Electrode</b><br>900100  |
| 900002    | Double junction reference electrode inner fill solution, equitransferent solution with Ag/AgCl, 5 x 60 mL | <b>Double Junction Reference Electrode</b><br>900200  |
| 900003    | Double junction reference electrode outer fill solution, 10 % KNO <sub>3</sub> , 5 x 60 mL                | <b>Double Junction Reference Electrode</b><br>900200  |

### pH Accessories

| Cat. No. | Description   |
|----------|---|
| 020017   | No Cal electrode storage chamber                      |
| 810017   | Storage sleeve and base for 12 mm x 120 mm electrodes |
| 910003   | 12 mm electrode storage bottles, 3 pack               |
| 910004   | 8 mm electrode storage bottles, 3 pack                |
| 910005   | Bulb guard for glass pH electrode, 5 pack             |
| 910006   | 6 mm electrode storage bottles, 3 pack                |

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 for more product information.



## Thermo Scientific Orion Ion Selective Electrodes

Ion Selective Electrodes (ISE) are easy to use and provide you the best performance and reliability

Measurement by ISE can be performed in virtually every laboratory. ISEs measure ion concentrations in samples such as water, food, pharmaceuticals and biological samples. There have been many analytical methods that have been developed and published world-wide for the use of ISEs. The variety of methods available is the main advantage of using ISE technology.

### Efficient and Economical

Electrode measurements are simpler and faster than other analytical techniques. Time consuming sample steps such as filtration and distillations are rarely needed. Analysis time is typically under 1 minute. Typically the cost per test is only a few cents. Compared to other methods such as atomic absorption or ion chromatography, there is a small setup cost and it does not require additional expensive readout equipment. Sample color or turbidity do not affect the measurement.

### Measurement Techniques

**Direct Measurement** is a simple procedure for measuring a large number of samples. Each sample only requires one reading. Only a small sample volume is required. Calibration is performed on a series of standards. The concentration is then determined by comparison to the standards. Ionic strength adjustor is added to all solutions to ensure samples and standards have similar ionic strength, proper pH and reduce the effect of interfering ions. Orion ISE meters calculate and store the calibration curves.

**Low Level Measurement** is a similar method to direct measurement. It is recommended when the sample is not in the linear response range. A minimum 3 point calibration is recommended to compensate for the non-linear response. Calibration is performed in one beaker reducing the chance of cross contamination of the standards.

**Know Addition** is a useful method for measuring samples since calibration is not required. This method is recommended when measuring only a few samples, when samples have a high ionic strength (>0.1 M) or when there is a complicated background matrix. An aliquot of standard solution containing the measured species is added to the sample. The sample concentration is determined by the changes in potential before and after the addition. Orion ISE meters automatically calculate the result.

**Analate Subtraction** is also a useful method for measuring samples since calibration is not required. The electrodes are immersed in a reagent solution that contains a species that the electrode senses and then it reacts with the sample. It is useful when sample size is small, for samples for which a standard is difficult to prepare, and for viscous or very concentrated samples. The method is not suited for very diluted samples. It is also necessary to know the stoichiometric ration between sample and standard.

**Titrations** are quantitative analytical techniques for measuring the concentration of a species by incremental addition of a reagent (titrant) that reacts with the sample species. Sensing electrodes can be used for determination of the titration end point. Ion selective electrodes are useful as end point detectors because they are unaffected by sample color or turbidity.

### Half Cell Ion Selective Electrodes

|                                       |  |
|---------------------------------------|--|
| <b>Solid-State Half-Cell ISE</b>      |  |
| Epoxy body                            | Fluoride, Chloride, Cyanide, Silver-Sulfide, Lead, Bromide, Cadmium, Cupric, Iodide, Thiocyanate |
| Require separate reference            |  |
| Temperature range 0-80 °C             |  |
| <b>Plastic Membrane Half-Cell ISE</b> |  |
| PVC body                              | Nitrate, Potassium, Calcium, Ammonium, Fluoroborate  |
| Require separate reference            |  |
| Temperature range 0-40 °C             |  |
| <b>ROSS® Half-Cell ISE</b>            |  |
| Glass body                            | Sodium   |
| Requires ROSS half-cell reference     |  |
| Temperature range 0-100 °C            |  |

### Combination Ion Selective Electrodes

Sure-Flow® Reference makes electrode easy to clean and long lasting

















|   |   |
|---|---|
| <b>Ionplus® Sure-Flow® Combination ISE</b>                |   |
| Epoxy body  | Fluoride, Chloride, Cyanide, Silver-Sulfide, Lead, Bromide, Cadmium, Cupric, Iodide |
| Temperature range 0-80 °C                                 |   |
| <b>Ionplus Sure-Flow Combination Plastic Membrane ISE</b> |   |
| PVC body  | Nitrate, Potassium, Calcium   |
| Temperature range 0-40 °C                                 |   |
| <b>ROSS Sure-Flow® Combination ISE</b>                    |   |
| Glass body  | Sodium  |
| Temperature range 0-100 °C                                |   |

### Various ISE Applications

|                                |  |
|--------------------------------|--|
| <b>Agriculture</b>             | Nitrate, chloride, ammonia, potassium, calcium, iodide, cyanide in soil, fertilizer and feedstuffs |
| <b>Biomedical</b>              | Calcium, carbon dioxide and ammonia in biological cultures (not in vitro or in vivo)               |
| <b>Dairy Products</b>          | Chloride, fluoride, iodide, calcium, potassium   |
| <b>Dental</b>                  | Fluoride, calcium in teeth and toothpaste  |
| <b>Education</b>               | Various ISEs in teaching and research labs   |
| <b>Food &amp; Beverage</b>     | Chloride, nitrate, sodium, calcium, potassium  |
| <b>Geology</b>                 | Fluoride and calcium in rocks  |
| <b>Metal Plating</b>           | Fluoride, copper, cyanide, chloride  |
| <b>Plant Tissue</b>            | Nitrate, chloride, fluoride, iodide, cyanide, calcium, potassium and sodium                        |
| <b>Power, Steam Generators</b> | Chloride, sodium and residual chlorine in boiler feeds   |
| <b>Pulp and Paper</b>          | Sodium, chloride, sulfide and calcium in liquors   |
| <b>Soil</b>                    | Nitrate, calcium, sodium, potassium, bromide, chloride, ammonia, fluoride                          |
| <b>Water, Drinking</b>         | Nitrate, residual chlorine, fluoride, cyanide, sulfide, ammonia                                    |
| <b>Water, Sea</b>              | Sodium, chloride, fluoride, nitrate, ammonia   |
| <b>Water, Waste</b>            | Nitrate, ammonia, residual chlorine, sulfides  |
| <b>Wine</b>                    | Potassium, sodium, fluoride, calcium   |



## Thermo Scientific Orion Ion Selective Electrode Selection Guide

| Species   | Cat. No.                                     | Construction                                   | Measurement Range   | Optimum Temperature Range | Required Reference Electrode | Reference Filling Solution       | Calibration Standards   | Required ISA   |
|---|--|--|---|---------------------------|------------------------------|----------------------------------|---|--|
| <b>Ammonia standard (NH<sub>3</sub>)</b>           | 9512BNWP <sup>1</sup>                        | Gas sensing combination                        | 5 x 10 <sup>-7</sup> to 1.0 M<br>0.01 to 17,000 ppm                 | 0 to 50 °C                | Included                     | 951202                           | 0.1 M NH <sub>4</sub> Cl / 951006   | 951211    |
| <b>Ammonia high performance</b>                    | 9512HPBNWP <sup>1</sup>                      | Gas sensing combination                        | 5 x 10 <sup>-7</sup> to 1.0 M<br>0.01 to 17,000 ppm                 | 0 to 50 °C                | Included                     | 951209                           | 0.1 M NH <sub>4</sub> Cl / 951006   | 951210    |
| <b>Ammonium (NH<sub>4</sub><sup>+</sup>)</b>  | 931801 <sup>8</sup>                          | Plastic membrane half-cell                     | 5 x 10 <sup>-7</sup> to 1.0 M<br>0.01 to 17,000 ppm                 | 0 to 40 °C                | 900200                       | 900002 inner/<br>900018-WA outer | 1000 ppm as N / 951007  | –  |
| <b>Bromide (Br<sup>-</sup>) ionplus Design</b>  | 9635BNWP <sup>1</sup>                        | ionplus sure-flow solid state combination      | 5 x 10 <sup>-6</sup> to 1.0 M<br>0.40 to 79,900 ppm                 | 0 to 80 °C                | Included                     | 900063                           | 0.1 M NaBr / 943506   | 940011   |
| <b>Bromide (Br<sup>-</sup>)</b>   | 9435BN <sup>2</sup><br>9435SC <sup>3</sup>   | Solid state half-cell                          | 5 x 10 <sup>-6</sup> to 1.0 M<br>0.40 to 79,900 ppm                 | 0 to 80 °C                | 900200                       | 900002 inner /<br>900003 outer   | 0.1 M NaBr / 943506   | 940011   |
| <b>Cadmium (Cd<sup>2+</sup>) ionplus Design</b>   | 9648BNWP <sup>1</sup>                        | ionplus sure-flow solid state combination      | 1 x 10 <sup>-7</sup> to 0.1 M<br>0.01 to 11,200 ppm                 | 0 to 80 °C                | Included                     | 900061                           | Consult user guide  | 940011   |
| <b>Cadmium (Cd<sup>2+</sup>)</b>  | 9448BN <sup>2</sup><br>9448SC <sup>3</sup>   | Solid state half-cell                          | 1 x 10 <sup>-7</sup> to 0.1 M<br>0.01 to 11,200 ppm                 | 0 to 80 °C                | 900200                       | 900002 inner /<br>900003 outer   | Consult user guide  | 940011   |
| <b>Calcium (Ca<sup>2+</sup>) ionplus Design</b>   | 9720BNWP <sup>1</sup>                        | ionplus sure-flow plastic membrane combination | 5 x 10 <sup>-7</sup> to 1.0 M<br>0.02 to 40,100 ppm                 | 0 to 40 °C                | Included                     | 900061                           | 0.1 M CaCl <sub>2</sub> / 922006<br>100 ppm CaCO <sub>3</sub> / 923206  | 932011   |
| <b>Calcium (Ca<sup>2+</sup>)</b>  | 9320BN <sup>2</sup>                          | Plastic membrane half-cell                     | 5 x 10 <sup>-7</sup> to 1.0 M<br>0.02 to 40,100 ppm                 | 0 to 40 °C                | 900100                       | 900011                           | 0.1 M CaCl <sub>2</sub> / 922006<br>100 ppm CaCO <sub>3</sub> / 923206  | 932011   |
| <b>Carbon Dioxide (CO<sub>2</sub>)</b>  | 9502BNWP <sup>1</sup>                        | Gas sensing combination                        | 1 x 10 <sup>-4</sup> to 1 x 10 <sup>-2</sup> M<br>4.4 to 440 ppm    | 0 to 50 °C                | Included                     | 950202                           | 0.1 M NaHCO <sub>3</sub> / 950206<br>1000 ppm as CaCO <sub>3</sub> / 950207   | 950210   |
| <b>Chloride (Cl<sup>-</sup>) ionplus Design</b>  | 9617BNWP <sup>1</sup>                        | ionplus sure-flow solid state combination      | 5 x 10 <sup>-6</sup> to 1.0 M<br>1.8 to 35,500 ppm                  | 0 to 80 °C                | Included                     | 900062                           | 0.1 M NaCl / 941706<br>100 ppm Cl <sup>-</sup> / 941707<br>1000 ppm Cl <sup>-</sup> / 941708  | 940011 or<br>941709 /<br>CISA                           |
| <b>Chloride (Cl<sup>-</sup>)</b>                 | 9417BN <sup>2</sup><br>9417SC <sup>3</sup>   | Solid state half-cell                          | 5 x 10 <sup>-6</sup> to 1.0 M<br>1.8 to 35,500 ppm                  | 0 to 80 °C                | 900200                       | 900002 inner /<br>900003 outer   | 0.1 M NaCl / 941706<br>100 ppm Cl <sup>-</sup> / 941707<br>1000 ppm Cl <sup>-</sup> / 941708  | 940011 or<br>941709 /<br>CISA                           |
| <b>Chlorine (Cl<sub>2</sub>)</b>                 | 9770BNWP <sup>1</sup><br>9770SC <sup>3</sup> | Solid state combination                        | 1 x 10 <sup>-7</sup> to 3 x 10 <sup>-4</sup> M<br>0.01 to 20 ppm    | 0 to 50 °C                | Included                     | None required                    | 100 ppm as Cl <sub>2</sub> / 977007   | 977010 /<br>iodide reagent<br>977011 /<br>acid reagent  |
| <b>Cupric (Cu<sup>2+</sup>) ionplus Design</b>  | 9629BNWP <sup>1</sup>                        | ionplus sure-flow solid state combination      | 1 x 10 <sup>-8</sup> to 0.1 M<br>6.4 x 10 <sup>-4</sup> to 6350 ppm | 0 to 80 °C                | Included                     | 900063                           | 0.1 M Cu(NO <sub>3</sub> ) <sub>2</sub> / 942906  | 940011   |
| <b>Cupric (Cu<sup>2+</sup>)</b>   | 9429BN <sup>2</sup><br>9429SC <sup>3</sup>   | Solid state half-cell                          | 1 x 10 <sup>-8</sup> to 0.1 M<br>6.4 x 10 <sup>-4</sup> to 6350 ppm | 0 to 80 °C                | 900200                       | 900002 inner /<br>900003 outer   | 0.1 M Cu(NO <sub>3</sub> ) <sub>2</sub> / 942906  | 940011   |
| <b>Cyanide (CN<sup>-</sup>) ionplus Design</b>   | 9606BNWP <sup>1</sup>                        | ionplus sure-flow solid state combination      | 8 x 10 <sup>-6</sup> to 1 x 10 <sup>-2</sup> M<br>0.2 to 260 ppm    | 0 to 80 °C                | Included                     | 900062                           | Consult user guide  | 951011    |
| <b>Cyanide (CN<sup>-</sup>)</b>                  | 9406BN <sup>2</sup><br>9406SC <sup>3</sup>   | Solid state half-cell                          | 8 x 10 <sup>-6</sup> to 1 x 10 <sup>-2</sup> M<br>0.2 to 260 ppm    | 0 to 80 °C                | 900200                       | 900002 inner /<br>900003 outer   | Consult user guide  | 951011    |
| <b>Fluoride (F<sup>-</sup>) ionplus Design</b>   | 9609BNWP <sup>1</sup>                        | ionplus sure-flow solid state combination      | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated        | 0 to 80 °C                | Included                     | 900061                           | 0.1 M NaF / 940906<br>100 ppm F <sup>-</sup> / 940907<br>1 ppm F <sup>-</sup> w/ TISAB II / 040906<br>2 ppm F <sup>-</sup> w/ TISAB II / 040907<br>10 ppm F <sup>-</sup> w/ TISAB II / 040908 | 940909 /<br>TISAB II<br>940911 /<br>TISAB III  |
| <b>Fluoride (F<sup>-</sup>)</b>                  | 9409BN <sup>2</sup><br>9409SC <sup>3</sup>   | Solid state half-cell                          | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated        | 0 to 80 °C                | 900100                       | 900001                           | 0.1 M NaF / 940906<br>100 ppm F <sup>-</sup> / 940907<br>1 ppm F <sup>-</sup> w/ TISAB II / 040906<br>2 ppm F <sup>-</sup> w/ TISAB II / 040907<br>10 ppm F <sup>-</sup> w/ TISAB II / 040908 | 940909 /<br>TISAB II<br>940911 /<br>TISAB III  |



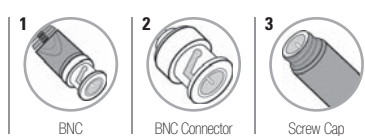
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| Species   | Cat. No.                                   | Construction  | Measurement Range   | Optimum Temperature Range | Required Reference Electrode | Reference Filling Solution  | Calibration Standards  | Required ISA   |
|---|--|---|---|---------------------------|------------------------------|---|--|--|
| <b>Fluoroborate (BF<sub>4</sub><sup>-</sup>)</b>                          | 9305BN <sup>2</sup>                        | Plastic membrane half-cell  | 7 x 10 <sup>-6</sup> to 1.0 M<br>0.6 to 86,800 ppm  | 0 to 40 °C                | 900200                       | 900002 inner / dilute ISA outer   | Consult user guide   | 930711   |
| <b>Iodide (I<sup>-</sup>) ionplus Design</b>                              | 9653BNWP <sup>1</sup>                      | ionplus <sup>®</sup> sure-flow <sup>®</sup> solid state combination | 5 x 10 <sup>-6</sup> to 1.0 M<br>5 x 10 <sup>3</sup> to 127,000 ppm   | 0 to 80 °C                | Included                     | 900063  | 0.1 M NaI / 945306   | 940011   |
| <b>Iodide (I<sup>-</sup>)</b>   | 9453BN <sup>2</sup><br>9453SC <sup>3</sup> | Solid state half-cell   | 5 x 10 <sup>-6</sup> to 1.0 M<br>5 x 10 <sup>3</sup> to 127,000 ppm   | 0 to 80 °C                | 900200                       | 900002 inner / 900003 outer   | 0.1 M Na / 945306  | 940011   |
| <b>Lead (Pb<sup>2+</sup>) ionplus Design</b>                              | 9682BNWP <sup>1</sup>                      | ionplus sure-flow solid state combination                           | 1 x 10 <sup>-6</sup> to 0.1 M<br>0.2 to 20,700 ppm  | 0 to 80 °C                | Included                     | 900062  | 0.1 M Pb(ClO <sub>4</sub> ) <sub>2</sub> / 948206<br>0.1 M Na <sub>2</sub> SO <sub>4</sub> / 948207  | Consult instruction manual                                 |
| <b>Lead (Pb<sup>2+</sup>)</b>   | 9482BN <sup>2</sup><br>9482SC <sup>3</sup> | Solid state half-cell   | 1 x 10 <sup>-6</sup> to 0.1 M<br>0.2 to 20,700 ppm  | 0 to 80 °C                | 900200                       | 900002 inner / 900003 outer   | 0.1 M Pb(ClO <sub>4</sub> ) <sub>2</sub> / 948206<br>0.1 M Na <sub>2</sub> SO <sub>4</sub> / 948207  | Consult instruction manual                                 |
| <b>Nitrate (NO<sub>3</sub><sup>-</sup>) ionplus Design</b> <sup>EPA</sup> | 9707BNWP <sup>1</sup>                      | ionplus sure-flow plastic membrane combination                      | 7 x 10 <sup>-6</sup> to 1.0 M<br>0.1 to 14,000 ppm as N   | 0 to 40 °C                | Included                     | 900046  | 0.1 M NaNO <sub>3</sub> / 920706<br>1000 ppm N / 920707<br>100 ppm N / 930707  | 930711 or 930710 / nitrate ISS                             |
| <b>Nitrate (NO<sub>3</sub><sup>-</sup>)</b> <sup>EPA</sup>                | 9307BNWP <sup>1</sup>                      | Plastic membrane half-cell  | 7 x 10 <sup>-6</sup> to 1.0 M<br>0.1 to 14,000 ppm as N   | 0 to 40 °C                | 900200                       | 900002 inner / 900046 or ISA outer  | 0.1 M NaNO <sub>3</sub> / 920706<br>1000 ppm N / 920707<br>100 ppm N / 930707  | 930711 or 930710 / nitrate ISS                             |
| <b>Potassium (K<sup>+</sup>) ionplus Design</b>                           | 9719BNWP <sup>1</sup>                      | ionplus sure-flow plastic membrane combination                      | 1 x 10 <sup>-6</sup> to 1.0 M<br>0.04 to 39,000 ppm   | 0 to 40 °C                | Included                     | 900065  | 0.1 M KCl / 921906   | 931911   |
| <b>Potassium (K<sup>+</sup>)</b>  | 9319BN <sup>2</sup>                        | Plastic membrane half-cell  | 1 x 10 <sup>-6</sup> to 1.0 M<br>0.04 to 39,000 ppm   | 0 to 40 °C                | 900200                       | 900002 inner / dilute ISA outer   | 0.1 M KCl / 921906   | 931911   |
| <b>Silver/Sulfide (Ag<sup>+</sup>/S<sup>2-</sup>) ionplus Design</b>      | 9616BNWP <sup>1</sup>                      | ionplus sure-flow solid state combination                           | 1 x 10 <sup>-7</sup> to 1.0 M<br>0.01 to 107,900 ppm as Ag <sup>+</sup><br>0.003 to 32,100 ppm as S <sup>2-</sup> | 0 to 80 °C                | Included                     | 900062 for Ag <sup>+</sup> /S <sup>2-</sup><br>900067 for Ag <sup>+</sup><br>900061 for S <sup>2-</sup> | Consult user guide   | 940011 for Ag <sup>+</sup><br>941609 for S <sup>2-</sup> ⚠ |
| <b>Silver/Sulfide (Ag<sup>+</sup>/S<sup>2-</sup>)</b>                     | 9416BN <sup>2</sup><br>9416SC <sup>3</sup> | Solid state half-cell   | 1 x 10 <sup>-7</sup> to 1.0 M<br>0.01 to 107,900 ppm as Ag <sup>+</sup><br>0.003 to 32,100 ppm as S <sup>2-</sup> | 0 to 80 °C                | 900200                       | 900002 inner / 900003 outer   | Consult user guide   | 940011 for Ag <sup>+</sup><br>941609 for S <sup>2-</sup> ⚠ |
| <b>Sodium (Na<sup>+</sup>)</b>  | 8611BNWP <sup>1</sup>                      | ROSS <sup>®</sup> sure-flow combination                             | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated  | 0 to 100 °C               | Included                     | 900010 or 900012 for low level Na <sup>+</sup>  | 10 ppm Na <sup>+</sup> / 941105<br>100 ppm Na <sup>+</sup> / 941107<br>1000 ppm Na <sup>+</sup> / 841108<br>KA standard kit, 1 M NaCl with ISA / 650700<br>0.1 M NaCl / 941706 | 841111<br>841113 /<br>reconditioning solution              |
| <b>Sodium (Na<sup>+</sup>)</b>  | 8411BN <sup>2</sup>                        | ROSS half-cell  | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated  | 0 to 100 °C               | 800300 or 800500U            | 900010 or 900012 for low level Na <sup>+</sup>  | 10 ppm Na <sup>+</sup> / 941105<br>100 ppm Na <sup>+</sup> / 941107<br>1000 ppm Na <sup>+</sup> / 841108<br>KA standard kit, 1 M NaCl with ISA / 650700<br>0.1 M NaCl / 941706 | 841111<br>841113 /<br>reconditioning solution              |
| <b>Sodium (Na<sup>+</sup>)</b>  | 9811BN <sup>2</sup>                        | Micro combination   | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated  | 0 to 80 °C                | Included                     | 900004  | 0.1 M NaCl / 941706  | 841111   |
| <b>Surfactant</b>   | 9342BN <sup>2</sup>                        | Plastic membrane half-cell  | Endpoint indicator  | 0 to 40 °C                | 900200                       | 900002 inner / 810007 outer   | 0.5 M Hyamine titrant / 654201   | 654203 / sample additive                                   |
| <b>Thiocyanate (SCN<sup>-</sup>)</b>                                      | 9458BN <sup>2</sup>                        | Solid state half-cell   | 5 x 10 <sup>-6</sup> to 1.0 M<br>0.29 to 58,100 ppm   | 0 to 50 °C                | 900200                       | 900002 inner / 900003 outer   | Consult user guide   | 940011   |



**Key Information**

**1** BNC Waterproof Connector **2** BNC Connector  
**3** Screw Cap Connector, requires separate cable  
**8** Module only, requires separate 93 series electrode handle (9300BNWP or 9300SC)  
 All cap diameters are 16 mm at bottom of cap  
 All cable lengths are 1 meter



# Thermo Scientific Orion Fluoride Ion Selective Electrodes

The standard in fluoride ion analysis – EPA compliant

## Approved ASTM Method for Fluoride in Drinking Water and Wastewater

Analyze free fluoride ions in aqueous solutions reliably at low limits of detection. Measurements are quick, simple, accurate and economical.

Thermo Scientific Orion fluoride electrodes feature high quality lanthanum fluoride pellet sensors. Choose from combination electrodes or half cell designs. The fluoride half cell electrode requires a separate half cell reference electrode.

## Other Applications for Fluoride Electrodes

- **Phosphate:** Gran plot titration can determine phosphate in applications from animal feed to cleaning solutions to food and beverage
- **Ammonium Bifluoride:** Multiple known addition (MKA) titration method determines levels without need of removing interfering heavy metal ions
- **Aluminum:** Gran plot titration can determine micro and semi micro levels of aluminum

## Accessories and Solutions

A full line of supporting accessories is offered to meet your measurement needs. A variety of calibration standards are available. Low level standards have the added convenience of being pre-made with total ionic strength adjustor (TISAB) and requiring that TISAB be added only to your samples. TISAB II requires a 50:50 dilution with the sample and is available in gallon bottles. TISAB III is a concentrate and requires a 1:10 dilution.

### Convenient combination with reference



### Combination fluoride ISE with Sure-Flow reference

- Fluoride surface can be easily cleaned using toothpaste and a lint-free wipe
- Built-in Sure-Flow reference provides fast and stable readings

### Half cell reference design provides flexibility



### Half cells – Fluoride ISE and Sure-Flow™ reference

- Fluoride surface can be easily cleaned using toothpaste and a lint-free wipe
- Use with the 900100 single junction or 900200 double junction reference electrodes

| Cat. No.                 | 9609BNWP   | 9409BN<br>9409SC   | 900100      |
|--------------------------|--|--|-------------|
| <b>Measurement Range</b> | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated | –           |
| <b>Temp. Range</b>       | 0 to 80 °C   | 0 to 80 °C   | 0 to 100 °C |
| <b>Connector Type</b>    | BNC Waterproof   | BNC<br>Screw Cap   | Pin Tip     |

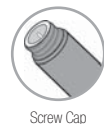
| Cat. No. | Recommended Accessories   |
|----------|---|
| 940906   | 0.1 M NaF standard, 475 mL  |
| 940907   | 100 ppm fluoride standard, 475 mL                                 |
| 040906   | 1 ppm fluoride standard with TISAB II, 475 mL                     |
| 040907   | 2 ppm fluoride standard with TISAB II, 475 mL                     |
| 040908   | 10 ppm fluoride standard with TISAB II, 475 mL                    |
| 940909   | TISAB II, 1 gallon  |
| 940999   | TISAB II, 4 x 1 gallon  |
| 940911   | TISAB III concentrate, 475 mL                                     |
| 900061   | Optimum results A electrode fill solution for 9609BNWP, 5 x 60 mL |
| 900001   | Fill solution for 900100 used with 9409BN/9409SC, 5 x 60 mL       |



BNC Waterproof



BNC



Screw Cap



Pin Tip



# Thermo Scientific Orion Ammonia Ion Selective Electrodes

Compliant with EPA testing methods

## EPA Approved ASTM D1426 Method for Ammonia in Wastewater

Measurements are quick, simple, accurate and economical.

Thermo Scientific Orion ammonia electrodes feature time-tested membrane technology. Choose from high performance and standard designs.

The high performance ammonia electrode offers linear response down to the lower limits of detection. The electrode can detect down to 0.01 ppm. The high performance ammonia electrode can achieve response times of 1 minute in samples of 1 ppm or higher. It is rugged and meets the rigorous requirements of waste water and drinking water operators. Supplied with pack of 20 loose membranes, 1 pre-assembled outer body and 2 bottles of fill solution.

## Other Applications for Ammonia Electrodes

- **Ammonium or Nitrogen:** Measure ammonium after conversion to ammonia or nitrogen after Kjeldahl digestion of sample

## Accessories and Solutions

A full line of supporting accessories is offered to meet your measurement needs.

**High performance ammonia electrode**



**Standard ammonia electrode**



Pre-assembled body and membrane simplifies use and achieves optimum performance

Provides reliable results at mid to high ammonia levels

| Cat. No.                 | 9512HPBNWP  | 9512BNWP  |
|--------------------------|---|---|
| <b>Measurement Range</b> | 5 x 10 <sup>-7</sup> to 1.0 M<br>0.01 to 17,000 ppm | 5 x 10 <sup>-7</sup> to 1.0 M<br>0.01 to 17,000 ppm |
| <b>Temp. Range</b>       | 0 to 50 °C  | 0 to 50 °C  |
| <b>Connector Type</b>    | BNC Waterproof                                      | BNC Waterproof                                      |

### HP Electrode

| Cat. No. | Recommended Accessories  |
|----------|--|
| 951214   | Loose membranes for HP electrodes, box of 20                                 |
| 951215   | Pre-assembled outer body and membrane cap assembly for HP electrodes, 3 pack |
| 951210   | pH adjusting ISA, for samples with no metallic ions, 475 mL                  |
| 951211   | pH adjusting ISA, for samples containing metallic ions, 475 mL               |
| 951213   | Ammonia electrode storage solution, 475 mL                                   |
| 951209   | HP ammonia electrode filling solution, 60 mL                                 |
| 951006   | 0.1 M NH <sub>4</sub> Cl standard, 475 mL                                    |
| 951007   | 1000 ppm ammonia as nitrogen standard, 475 mL                                |

### Standard Electrode

| Cat. No. | Recommended Accessories  |
|----------|--|
| 951204   | Loose membranes for standard electrodes, box of 20             |
| 951205   | Bonded membranes for standard electrodes, pack of 3            |
| 951210   | pH adjusting ISA, for samples with no metallic ions, 475 mL    |
| 951211   | pH adjusting ISA, for samples containing metallic ions, 475 mL |
| 951213   | Ammonia electrode storage solution, 475 mL                     |
| 951202   | Standard ammonia electrode filling solution, 60 mL             |
| 951006   | 0.1 M NH <sub>4</sub> Cl standard, 475 mL                      |
| 951007   | 1000 ppm ammonia as nitrogen standard, 475 mL                  |



BNC Waterproof



# Thermo Scientific Orion Nitrate Ion Selective Electrodes

Compliant with EPA testing methods

## The Easy Way to Measure Nitrate Levels in Drinking Water, Wastewater and Soils

Analyze free nitrate ions in aqueous solutions reliably at low limits of detection. Measurements are quick, simple, accurate and economical.

Choose from combination electrodes or half cell designs. The nitrate half cell electrode requires a separate half cell reference electrode.

## Other Applications for Nitrate Electrodes

- **Nitric Acid:** Multiple known addition (MKA) titration method determines levels without need of removing interfering heavy metal ions.

## Accessories and Solutions

A full line of supporting accessories is offered to meet your measurement needs. A variety of calibration standards are available. Replacement modules are available individually or in convenient three packs.

### Convenient combination electrode with replaceable module



### Half cell reference design provides flexibility



### Combination nitrate ISE with Sure-Flow™ reference

- Sure-Flow reference provides stable readings and is easy to clean
- Convenient with small sample sizes

### Half cells – Nitrate ISE and Sure-Flow™ reference

- Reference junction is reliable and easy to maintain
- Replaceable module provides convenience

| Cat. No.          | 9707BNWP  | 9307BNWP  | 900200      |
|-------------------|---|---|-------------|
| Measurement Range | 7 × 10 <sup>-6</sup> to 1.0 M<br>0.1 to 14,000 ppm as N | 7 × 10 <sup>-6</sup> to 1.0 M<br>0.1 to 14,000 ppm as N | –           |
| Temp. Range       | 0 to 40 °C  | 0 to 40 °C  | 0 to 100 °C |
| Connector Type    | BNC Waterproof  | BNC Waterproof  | Pin Tip     |

| Cat. No. | Recommended Accessories   |
|----------|---|
| 900046   | Optimum results F electrode fill solution, 5 x 60 mL. For 9707BNWP and outer fill solution for 900200 |
| 900002   | Inner chamber fill solution for 900200, 5 x 60 mL   |
| 920706   | 0.1 M NaNO <sub>3</sub> standard solution, 475 mL   |
| 920707   | 1000 ppm nitrate as nitrogen standard, 475 mL   |
| 930707   | 100 ppm nitrate as nitrogen standard, 475 mL  |
| 930711   | Nitrate ionic strength adjustor (ISA), 475 mL   |
| 930710   | Nitrate interference suppressor solution (NISS), 475 mL   |
| 970701   | Replacement module for 9707BNWP (1 each)  |
| 930701   | Replacement module for 9307BNWP (pack of 3)   |
| 930702   | Replacement module for 9307BNWP (1 each)  |



BNC Waterproof



Pin Tip





# Thermo Scientific Orion Chloride Ion Selective Electrodes

Compliant with EPA testing methods

## Approved ASTM Method for Chloride in Wastewater

Easily and reliably analyze free chloride ions in aqueous solutions. Provides quick, accurate and economical measurements. Rugged epoxy body design ensures durability of electrode.

## Other Applications for Chloride Electrodes

- **Salt:** Multiple known addition can be used to determine salt levels in food samples
- **Hydrochloric Acid:** First derivative titration can determine HCl concentrations

## Accessories and Solutions

Thermo Scientific offers a full line of accessories to enhance your measurements. These include calibration standards, two ionic strength adjustors – one to adjust background ionic strength (ISA) and another to minimize complexation interferences and adjust background ionic strength (CISA), and choice of fill solutions depending on sample composition.

Convenient combination with Sure-Flow reference



Half cell reference design provides flexibility



Combination chloride ISE with Sure-Flow® reference

- Durable reference pellet which can be polished to restore electrode performance
- Sure-Flow reference provides easy maintenance and optimum performance

Half cells - Chloride ISE and double junction Sure-Flow reference

- Double junction reference isolates inner reference from sample
- Designed for precision measurements

| Cat. No.          | 9617BNWP   | 9417BN<br>9417SC                                   | 900200      |
|-------------------|--|--|-------------|
| Measurement Range | 5 x 10 <sup>-5</sup> to 1.0 M<br>1.8 to 35,000 ppm | 5 x 10 <sup>-5</sup> to 1.0 M<br>1.8 to 35,000 ppm | —           |
| Temp. Range       | 0 to 80 °C   | 0 to 80 °C   | 0 to 100 °C |
| Connector Type    | BNC Waterproof                                     | BNC<br>Screw cap                                   | Pin Tip     |

| Cat. No. | Recommended Accessories  |
|----------|--|
| 940011   | Chloride ionic strength adjustor (ISA), 475 mL   |
| 941709   | Chloride CISA reagent pack, 2 x 2 L  |
| 941706   | 0.1 M NaCl standard, 475 mL  |
| 941708   | 1000 ppm chloride standard, 475 mL   |
| 941707   | 100 ppm chloride standard, 475 mL  |
| 900062   | Optimum results B fill solution for 9617BNWP, 5 x 60 mL  |
| 900017   | Chloride electrode fill solution, 5 x 60 mL, for samples more concentrated than 10 <sup>-2</sup> M |
| 900003   | Outer chamber fill solution for 900200, 5 x 60 mL  |
| 900002   | Inner chamber fill solution for 900200, 5 x 60 mL  |
| 948201   | Polishing strips, pack of 24   |



BNC Waterproof



BNC



Screw Cap



Pin Tip



# Thermo Scientific Orion ROSS® Sodium Ion Selective Electrodes

ROSS Fast Response and Stability

## Comes with Complete Solution Kit Containing Standards, Reagents, ISA and More!

Quick, accurate and economical measurements of free sodium ions in aqueous solutions. Chemical resistant glass body.

## Applications for Sodium Electrodes

The sodium electrode is commonly used to measure samples such as food, beverages and animal feed.

## Accessories and Solutions

Thermo Scientific provides you all the accessories you need for sodium measurement when you purchase a ROSS sodium electrode. Each electrode comes with electrode fill solution, sodium ionic strength adjustor, 3 different sodium standards, sodium electrode reconditioning solution and sodium electrode storage solution.

### Convenient combination with Sure-Flow reference



### Combination Ross Sodium ISE with Sure-Flow® reference

- Unique redox ROSS reference system provides fast response, better stability and accuracy than conventional sodium electrodes
- Sure-Flow reference prevents clogging while giving fast, stable readings

### Half cell reference design provides flexibility with choice of ROSS references



### Half cells - Chloride ISE and double junction Sure-Flow reference and optimum performance

- Choice of ROSS reference systems: ROSS Sure-Flow reference (800300) with easy to clean and reliable junction
- ROSS Ultra® reference (800500U) with ROSS performance and extended life with 2 year warranty

| Cat. No.          | 8611BNWP   | 8411BN   | 800300<br>800500U |
|-------------------|--|--|-------------------|
| Measurement Range | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated | 1 x 10 <sup>-6</sup> M to saturated<br>0.02 ppm to saturated | —                 |
| Temp. Range       | 0 to 100 °C  | 0 to 100 °C  | 0 to 100 °C       |
| Connector Type    | BNC Waterproof   | BNC  | Pin Tip           |

| Cat. No. | Recommended Accessories  |
|----------|--|
| 941706   | 0.1 M NaCl standard, 475 mL  |
| 841108   | 1000 ppm sodium standard, 475 mL   |
| 941107   | 100 ppm sodium standard, 475 mL  |
| 941105   | 10 ppm sodium standard, 475 mL   |
| 650700   | Known addition kit – 3 x 475 mL of 1 M NaCl standard with ISA and 1 x 475 mL ISA           |
| 841109   | Know addition standard, 1000 ppm as Na <sup>+</sup> with ISA, 475 mL                       |
| 841111   | Sodium ionic strength adjustor (ISA), 475 mL   |
| 841113   | Sodium electrode reconditioning solution, 475 mL   |
| 841101   | Sodium electrode storage solution, 475 mL  |
| 900010   | Sodium electrode fill solution, 5 x 60 mL  |
| 900012   | Sodium electrode fill solution for low sodium levels (below 10 <sup>-5</sup> M or 0.2 ppm) |



BNC Waterproof



BNC



Pin Tip



# ISE Calibration Standards, Ionic Strength Adjusters (ISA), Reagents and Fill Solutions

All ISE Standards are NIST traceable



| Cat. No.                                      | Description   |
|---|---|
| <b>Ammonia, Standard and High Performance</b> |   |
| 951006  | 0.1 M NH <sub>4</sub> Cl Ammonia standard, 475 mL                                     |
| 951007  | 1000 ppm Ammonia as Nitrogen (N) standard, 475 mL                                     |
| 951207  | 100 ppm Ammonia as Nitrogen (N) standard, 475 mL                                      |
| 951211  | ⚠ Ammonia Ionic Strength Adjuster (ISA) with pH-indicating blue dye, 475 mL           |
| 951210  | ⚠ Ammonia low level Ionic Strength Adjuster (ISA) with pH-indicating blue dye, 475 mL |
| 951213  | Ammonia electrode storage solution, 475 mL  |
| 951209  | Ammonia high perform electrode fill solution, 60 mL                                   |
| 951202  | Ammonia standard electrode fill solution, 60 mL                                       |
| <b>Ammonium</b>                               |   |
| 951007  | 1000 ppm Ammonium as Nitrogen (N) standard, 475 mL                                    |
| 900018-WA                                     | Ammonium electrode fill solution, 5 x 60 mL   |
| <b>Bromide</b>                                |   |
| 943506  | 0.1 M NaBr Bromide standard, 475 mL   |
| 940011  | Bromide Ionic Strength Adjuster (ISA), 475 mL   |
| 900063  | Optimum results D fill solution for Bromide electrode, 5 x 60 mL                      |
| <b>Cadmium</b>                                |   |
| 940011  | Cadmium Ionic Strength Adjuster (ISA), 475 mL   |
| 900061  | Optimum results A fill solution for Cadmium electrode, 5 x 60 mL                      |
| <b>Calcium</b>                                |   |
| 922006  | 0.1 M CaCl <sub>2</sub> Calcium standard, 475 mL                                      |
| 923206  | 100 ppm as CaCO <sub>3</sub> Calcium standard, 475 mL                                 |
| 932011  | Calcium Ionic Strength Adjuster (ISA), 475 mL   |
| 900061  | Optimum results A fill solution for Calcium electrode, 5 x 60 mL                      |
| <b>Carbon Dioxide</b>                         |   |
| 950206  | 0.1 M NaHCO <sub>3</sub> Carbon Dioxide standard, 475 mL                              |
| 950207  | 1000 ppm as CaCO <sub>3</sub> Carbon Dioxide standard, 475 mL                         |
| 950210  | Carbon Dioxide Ionic Strength Adjuster (ISA), 475 mL                                  |
| 950202  | Carbon Dioxide electrode fill solution, 60 mL   |
| <b>Chloride</b>                               |   |
| 941706  | 0.1 M NaCl Chloride standard, 475 mL  |
| 941708  | 1000 ppm Chloride standard, 475 mL  |
| 941707  | 100 ppm Chloride standard, 475 mL   |
| 940011  | Chloride Ionic Strength Adjuster (ISA), 475 mL  |
| 941709  | ⚠ Chloride Complexation Ionic Strength Adjuster (CISA) reagent pack, 2 x 1 L          |
| 900062  | Optimum results B fill solution for Chloride electrode, 5 x 60 mL                     |
| 900017  | Chloride electrode fill solution, 5 x 60 mL   |



|                           |   |
|---------------------------|---|
| <b>Chlorine, Residual</b> |   |
| 977007                    | 100 ppm as Cl <sub>2</sub> Residual Chlorine standard, 475 mL   |
| 977011                    | ⚠ Residual Chlorine acid reagent, 475 mL  |
| 977010                    | Residual Chlorine iodide reagent, 5 x 50 mL   |
| <b>Cupric</b>             |   |
| 942906                    | 0.1 M Cu(NO <sub>3</sub> ) <sub>2</sub> Cupric standard, 475 mL   |
| 940011                    | Cupric Ionic Strength Adjuster (ISA), 475 mL  |
| 900063                    | Optimum results D fill solution for Cupric electrode, 5 x 60 mL   |
| <b>Cyanide</b>            |   |
| 951011                    | ⚠ Cyanide alkaline reagent, 10 N NaOH, 475 mL   |
| 900062                    | Optimum results B fill solution for Cyanide electrode, 5 x 60 mL  |
| <b>Fluoride</b>           |   |
| 940906                    | 0.1 M NaF Fluoride standard, 475 mL   |
| 940907                    | 100 ppm Fluoride standard, 475 mL   |
| 040908                    | 10 ppm Fluoride standard premixed with TISAB II, color coded blue, 475 mL   |
| 040907                    | 2 ppm Fluoride standard premixed with TISAB II, color coded red, 475 mL   |
| 040906                    | 1 ppm Fluoride standard premixed with TISAB II, color coded green, 475 mL   |
| 940916                    | Fluoride standard bulk pack – 4 x 475 mL each of 1 ppm Fluoride standard premixed with TISAB II (040906) and 10 ppm Fluoride standard premixed with TISAB II (040908) |
| 940909                    | TISAB II for Fluoride ISE, 1 gallon   |
| 940999                    | TISAB II for Fluoride ISE, 4 x 1 gallon   |
| 940911                    | TISAB III (concentrated) for Fluoride ISE, 475 mL   |
| 900061                    | Optimum results A fill solution for Fluoride electrode, 5 x 60 mL   |
| <b>Fluoroborate</b>       |   |
| 930711                    | Fluoroborate Ionic Strength Adjuster (ISA), 475 mL  |
| <b>Iodide</b>             |   |
| 945306                    | 0.1 M NaI Iodide standard, 475 mL   |
| 940011                    | Iodide Ionic Strength Adjuster (ISA), 475 mL  |
| 900063                    | Optimum results D fill solution for Iodide electrode, 5 x 60 mL   |
| <b>Lead</b>               |   |
| 948206                    | 0.1 M Pb(ClO <sub>4</sub> ) <sub>2</sub> Lead standard, 475 mL  |
| 900062                    | Optimum results B fill solution for Lead electrode, 5 x 60 mL   |
| <b>Nitrate</b>            |   |
| 920706                    | 0.1 M NaNO <sub>3</sub> Nitrate standard, 475 mL  |
| 920707                    | 1000 ppm Nitrate as Nitrogen (N) standard, 475 mL   |
| 930707                    | 100 ppm Nitrate as Nitrogen (N) standard, 475 mL  |
| 930711                    | Nitrate Ionic Strength Adjuster (ISA), 475 mL   |
| 930710                    | Nitrate Interference Suppressor Solution (NISS), 475 mL   |
| 900046                    | Optimum results F fill solution for Nitrate electrode, 5 x 60 mL  |



| Nitrate Test Kit |  |
|------------------|--|
| 700005           | Nitrate test kit for Ammonia ISE – 2 x 50 mL electrode fill solution (951203), 2 x 475 mL alkaline reagent (951011), 475 mL 100 ppm Nitrate as Nitrogen (N) standard (930707), 475 mL 100 ppm Ammonia as Nitrogen (N) standard (951207), 475 mL reducing reagent (700006) and 2 pipets |
| 700006           | Nitrate test kit reducing reagent refill, 475 mL   |
| 951203           | Nitrate test kit electrode fill solution, 50 mL  |
| Nitrite          |  |
| 954606           | 0.1 M NaNO <sub>2</sub> Nitrite standard, 475 mL   |
| 934610           | Nitrite interference suppressor solution, 475 mL   |
| 900046           | Optimum results F fill solution for Nitrite electrode, 5 x 60 mL   |
| Nitrogen Oxide   |  |
| 954606           | 0.1 M NaNO <sub>2</sub> Nitrogen Oxide standard, 475 mL  |
| 956410           | Nitrogen Oxide acid buffer, 475 mL   |
| 954602           | Nitrogen Oxide electrode fill solution, 50 mL  |
| Perchlorate      |  |
| 930711           | Perchlorate Ionic Strength Adjuster (ISA), 475 mL  |
| Potassium        |  |
| 921906           | 0.1 M KCl Potassium standard, 475 mL   |
| 931911           | Potassium Ionic Strength Adjuster (ISA), 475 mL  |
| 900065           | Optimum results E fill solution for Potassium electrode, 5 x 60 mL   |
| Silver           |  |
| 940011           | Silver Ionic Strength Adjuster (ISA), 475 mL   |
| 900062           | Optimum results B fill solution for Silver/Sulfide electrode, 5 x 60 mL  |
| 900067           | Optimum results C fill solution for Silver electrode (when sample temperatures vary), 5 x 60 mL  |
| Sodium           |  |
| 941706           | 0.1 M NaCl Sodium standard, 475 mL   |
| 841108           | 1000 ppm Sodium standard, 475 mL   |
| 941107           | 100 ppm Sodium standard, 475 mL  |
| 941105           | 10 ppm Sodium standard, 475 mL   |
| 841111           | Sodium Ionic Strength Adjuster (ISA), 475 mL   |
| 841113           | Sodium electrode reconditioning solution, 475 mL   |
| 841101           | Sodium electrode storage solution, 475 mL  |
| 650700           | Sodium KAP analysis kit – 3 x 475 mL of 1 M NaCl with ISA and 475 mL of Sodium ISA (841111)  |
| 841109           | Sodium KAP standard, 1000 ppm with ISA, 475 mL   |
| 900010           | Sodium electrode fill solution, 5 x 60 mL  |
| 900012           | Sodium electrode (low level) fill solution, 5 x 60 mL  |
| 900004           | Sodium micro electrode fill solution, 5 x 60 mL  |



| Sulfate        |  |
|----------------|--|
| 948207         | 0.1 M Na <sub>2</sub> SO <sub>4</sub> sulfate standard for lead electrode, 475 mL                |
| Sulfide        |  |
| 941609         | Sulfide SAOB reagent pack, 4 x 475 mL  |
| 900061         | Optimum results A fill solution for Sulfide electrode (when sample temperatures vary), 5 x 60 mL |
| 900062         | Optimum results B fill solution for Silver/Sulfide electrode, 5 x 60 mL                          |
| Surfactant     |  |
| 654202         | 0.01 M SLS Surfactant standard, 1 x 60 mL  |
| 654201         | 0.05 M hyamine Surfactant titrant, 475 mL  |
| 654205         | Non-ionic Surfactant titrant, 475 mL   |
| 654203         | Surfactant sample additive, tritonX-100, 475 mL  |
| 810007         | Surfactant electrode fill solution, 5 x 60 mL  |
| Thiocyanate    |  |
| 940011         | Thiocyanate Ionic Strength Adjuster (ISA), 475 mL  |
| Water Hardness |  |
| 922006         | 0.1 M CaCl <sub>2</sub> Water Hardness standard, 475 mL  |
| 923206         | 100 ppm as CaCO <sub>3</sub> Water Hardness standard, 475 mL                                     |



Signifies a hazardous solution. See terms and conditions for important shipping information at [www.thermoscientific.com/water](http://www.thermoscientific.com/water)



**ISE Accessories, Membranes and Modules**

| Cat. No.   | Description  |
|--|--|
| 948201   | Polishing strips for solid state electrodes                          |
| <b>Ammonia, High Performance (9512HPBNWP, 9512HP01)</b>  |  |
| 951214   | 20 loose membranes   |
| 951215   | 3 pre-assembled bodies and membrane caps                             |
| <b>Ammonia, Standard (9512BNWP, 951201)</b>  |  |
| 951204   | 20 loose membranes   |
| 951205   | 3 bonded membranes   |
| <b>Carbon Dioxide (9502BNWP)</b>   |  |
| 950204   | 4 membranes with o-rings   |
| <b>Nitrogen Oxide (9546BN)</b>   |  |
| 954604   | 20 loose membranes   |
| 950015   | Spare electrode parts kit  |
| <b>97 Series Plastic Membrane Calcium, Nitrate and Potassium Combination Electrode Accessories</b>   |  |
| 9700BNWP   | 97 series electrode body with waterproof BNC connection              |
| 972001   | Replacement module for calcium combination electrode (9720BNWP)      |
| 970701   | Replacement module for nitrate combination electrode (9707BNWP)      |
| 971901   | Replacement module for potassium combination electrode (9719BNWP)    |
| <b>93 Series Plastic Membrane Ammonium, Calcium, Chloride, Fluoroborate, HF Resistant pH, Nitrate, Perchlorate, Potassium and Water Hardness Half-Cell Electrode Accessories</b> |  |
| 9300BNWP   | 93 series electrode body with waterproof BNC connection              |
| 930000   | 93 series electrode body with U.S. standard connection               |
| 9300SC   | 93 series electrode body with screw cap, separate cable required     |
| 900100   | Single junction reference electrode with pin tip connection          |
| 900200   | Double junction reference electrode with pin tip connection          |
| 931801   | Replacement module for ammonium half-cell electrode                  |
| 932001   | Replacement module for calcium half-cell electrode (9320BN)          |
| 931701   | Replacement module for chloride half-cell electrode                  |
| 930501   | Replacement module for fluoroborate half-cell electrode (9305BN)     |
| 930702   | Replacement module for nitrate half-cell electrode (9307BNWP)        |
| 930701   | Replacement modules (3) for nitrate half-cell electrode (9307BNWP)   |
| 938101   | Replacement module for perchlorate half-cell electrode               |
| 930101   | Replacement module for HF-resistant pH half-cell electrode           |
| 931901   | Replacement module for potassium half-cell electrode (9319BN)        |
| 933201   | Replacement module for water hardness half-cell electrode (9332BNWP) |

Visit the WAI Online Library on [www.thermoscientific.com/water](http://www.thermoscientific.com/water) for the most up-to-date MSDS and Certificate of Analysis files for Orion solutions.





## Thermo Scientific Orion Conductivity Cells

### Background/Theory

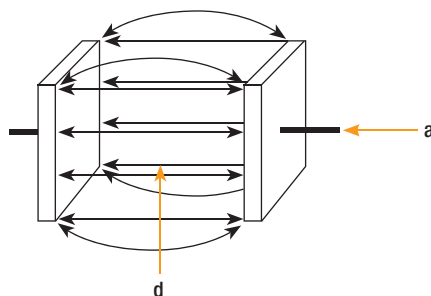
Electrical conductivity is an inherent property of most materials, and ranges from extremely conductive materials such as metals to non-conductive materials like plastic or glass. In between the two extremes are aqueous solutions, such as sea water and plating baths. In metals, the electrical current is carried by electrons while in water it is carried by charged ions. In both cases, the conductivity is determined by the number of charge carriers, how fast they move, and how much charge each one carries. Thus for most water solutions, the higher the concentration of dissolved salts, which will lead to more ions, the higher the conductivity. This effect continues until the solution gets too crowded, restricting the freedom of the ions to move and the conductivity may actually decrease with increasing concentration. This can result in two different concentrations of a salt having the same conductivity.

Conductance is defined as the reciprocal of resistance and is measured in Siemens (S), which was formerly referred to as mhos. Conductivity is an inherent property of any given solution and is derived from conductance by the geometry of the measuring cell. A measurement results in the conductance of the sample and it is converted to conductivity. This is done by measuring the cell constant (K) for each setup using a solution of known conductivity.

$$\text{Cell conductance} \times \text{Cell constant (K)} = \text{Conductivity}$$

The Cell constant is related to the physical characteristics of the measuring cell. K is defined for 2 flat parallel measuring electrodes as the electrode separation distance (d) divided by the electrode area (a). In practice, the measured cell constant value is entered into the meter and the conversion from conductance to conductivity is done automatically.

$$K = d/A = 1 \text{ cm}^{-1}$$



### Temperature

Temperature can have a substantial effect on conductivity. Raising the temperature makes water less viscous, and the ions can move faster. Because the ions are of different sizes, and carry different amounts of water with them as they move, the temperature effect is different for each ion. Typically the conductivity varies by 1-3 % per degree C.

### Storage

Conductivity cells require minimal storage compared to other electrodes. They can be stored in deionized water in-between measurements. For storage overnight or longer, conductivity cells should be rinsed thoroughly in deionized water and stored dry.

### Maintenance

Conductivity cells should be cleaned periodically to maintain maximum performance. If they become contaminated they should be cleaned. Refer to user guides for specific instructions for different electrode materials.

| Contaminant                | Cleaning Solution                                     |
|----------------------------|---|
| Water soluble contaminants | Deionized water                                       |
| Lubricants and oils        | Warm water and liquid detergent or ethanol or acetone |
| Lime or hydroxide          | 10 % acetic acid or 10 % hydrochloric acid            |

### Calibration

Cell constants at time of manufacture are listed on many conductivity cells. Calibration is essential since the cell constant can vary by 10 % or more from the nominal value and they do change over time. Once calibrated, they do not change quickly and do not require frequent calibration like a pH electrode. It is important to calibrate 25 °C or know the value of your calibration standard at different temperatures. Thermo Scientific Orion conductivity standards have tables for actual values at different temperatures.

### Benefits of Thermo Scientific Orion 2-Electrode Cells and 4-Electrode Cells

| 2-Electrode Cell Benefits  | 4-Electrode Cell Benefits  |
|--|--|
| Available in glass, allows use in most samples                           | All have durable epoxy bodies  |
| Best for ultra pure water measurements                                   | No error from cable resistance, allowing for longer cable lengths        |
| Multiple cell materials available, graphite, platinum or stainless steel | Minimum effect on accuracy from electrode polarization and contamination |
| Different cells designed to measure multiple specific ranges             | Wide measurement range   |
| Option for flow cell or flow-thru design                                 | Unaffected by deposits on cell surface                                   |

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[www.thermoscientific.com/waterlibrary](http://www.thermoscientific.com/waterlibrary)  
 for more product information.



# Thermo Scientific Orion Conductivity Cell Families

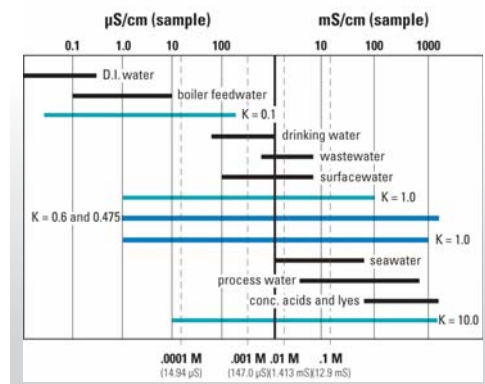
A wide range of conductivity cells are available for every application. These conductivity cells feature built-in temperature compensation; high, standard, and low conductivity measuring ranges; cell constants from 0.1 to 10 cm<sup>-1</sup> and a variety of probe materials including epoxy/graphite, glass/platinum, and stainless steel.

## DuraProbe™ 4-Electrode Conductivity Cells

DuraProbe 4-electrode cells provide the highest accuracy for demanding laboratory or field applications. The 4-electrode design compensates for electrode fouling, cable and connector resistance, polarization errors, and fringe field interference errors. The epoxy/graphite cell material is extremely durable and chemically resistant. DuraProbe conductivity cells are ideal for high and standard conductivity samples and difficult samples such as wastewater, runoff water, and mud.

## 2-Electrode Conductivity Cells

The 2-electrode cells are able to measure low, standard, and high conductivity samples, depending on the cell constant. Cells with a 0.1 cm<sup>-1</sup> cell constant are ideal for low ionic strength solutions, deionized water, and ultra pure water. Glass/platinum cells are the best for chemically reactive conductivity samples, since the cell material is highly chemical resistant.



## Cell Selection Sample Conductivity Range

- Conventional 2-Electrode Cells
- Conventional 4-Electrode Cells

### Rugged DuraProbe 4-electrode conductivity cell



- 013005MD<sup>A</sup>
- 013010MD<sup>A</sup>
- 013020MD<sup>A</sup>
- 013025MD<sup>A</sup>
- 013005A<sup>F</sup>
- 013010A<sup>F</sup>
- 013005D<sup>B</sup>
- Widest conductivity range
- For lab and field applications
- Rugged epoxy/graphite body
- Cable lengths from 1.5 to 10 meters

### Reliable DuraProbe 4-electrode conductivity cell

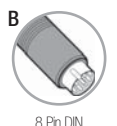
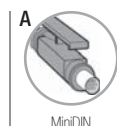


- 013605MD<sup>A</sup>
- 013610MD<sup>A</sup>
- 013610<sup>F</sup>
- Wide conductivity range
- For lab and field applications
- Rugged epoxy/graphite

### 2-electrode conductivity cell for ultra-pure water



- 013016MD<sup>A</sup>
- 013016A<sup>F</sup>
- 013016D<sup>B</sup>
- Low conductivity range
- For ultra pure water applications
- Includes detachable glass flow cell



### Key Information

**A** MiniDIN connector (Star) **B** 8 Pin DIN connector (A+ Series)













**F** 8 Pin Waterproof DIN connector (A Series)

**H** BNC and 2.5 mm Phono Jack connector (Russell)

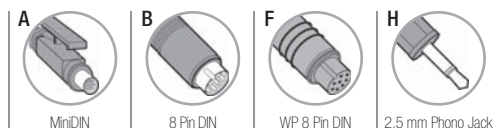
\*Conductivity cell does not have temperature compensation

\*\*3-Electrode Conductivity Cell

## Thermo Scientific Orion Conductivity Cell Families

| Platinized 2-electrode conductivity cell   | Chemical resistant 2-electrode conductivity cell   | Precise 2-electrode conductivity cell   | Rugged 2-electrode conductivity cell   | High range 2-electrode conductivity cell   | Chemical resistant 3-electrode conductivity cell   |
|--|--|---|--|--|--|
|   |   |    |    |   |   |
|   |   |    |   |   |   |
| <b>011020<sup>B</sup></b><br><b>011020A<sup>F</sup></b> <ul style="list-style-type: none"> <li>• Low conductivity range</li> <li>• For ultra pure water applications</li> <li>• Platinized glass/platinum</li> </ul> | <b>011010<sup>B</sup></b><br><b>011010A<sup>F</sup></b> <ul style="list-style-type: none"> <li>• Standard conductivity range</li> <li>• For lab applications</li> <li>• Chemical resistant glass body</li> </ul> | <b>011050MD<sup>A</sup></b><br><b>011050<sup>B</sup></b> <ul style="list-style-type: none"> <li>• Standard conductivity range</li> <li>• For lab and field applications</li> <li>• Platinized epoxy/platinum</li> </ul> | <b>011510MD<sup>A</sup></b><br><b>011510-WA<sup>B</sup></b> <ul style="list-style-type: none"> <li>• Standard conductivity range</li> <li>• For lab and field applications</li> <li>• Rugged epoxy/graphite</li> </ul> | <b>018020MD<sup>A *</sup></b> <ul style="list-style-type: none"> <li>• High conductivity range</li> <li>• For lab applications</li> <li>• Chemical resistant glass body</li> <li>• Flow through or dip cell</li> </ul> | <b>014005<sup>H **</sup></b> <ul style="list-style-type: none"> <li>• Rugged epoxy/stainless steel</li> <li>• Removable guard</li> </ul> |

See page 104 for a full offering of conductivity cell accessories



### Key Information

**A** MiniDIN connector (Star) **B** 8 Pin DIN connector (A+ Series)

**F** 8 Pin Waterproof DIN connector (A Series)

**H** BNC and 2.5 mm Phono Jack connector (Russell)

\*Conductivity cell does not have temperature compensation

\*\*3-Electrode Conductivity Cell





# Thermo Scientific Orion Conductivity Cell Selection Guide

## 4-Electrode Conductivity Cells

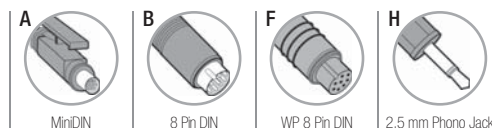
| Cat. No.              | Cable Length | Meter Compatibility  | Measurement Range     | Application   | Approximate Cell Constant | Cell Material  | Dimensions                     | Min/Max Immersion |
|-----------------------|--------------|--|-----------------------|---------------|---------------------------|----------------|--------------------------------|-------------------|
| 013005MD <sup>A</sup> | 1.5 m        | Star Series  | 1 µS/cm to 200 mS/cm  | Lab and field | 0.475 cm <sup>-1</sup>    | Epoxy/graphite | Dia - 15 mm<br>Length - 120 mm | 35/NA mm          |
| 013010MD <sup>A</sup> | 3 m          |  |                       |               |                           |                |                                |                   |
| 013020MD <sup>A</sup> | 6 m          |  |                       |               |                           |                |                                |                   |
| 013025MD <sup>A</sup> | 10 m         |  |                       |               |                           |                |                                |                   |
| 013605MD <sup>A</sup> | 1.5 m        | Star Series  | 10 µS/cm to 200 mS/cm | Lab and field | 0.55 cm <sup>-1</sup>     | Epoxy/graphite | Dia - 12 mm<br>Length - 120 mm | 35/NA mm          |
| 013610MD <sup>A</sup> | 3 m          |  |                       |               |                           |                |                                |                   |
| 013005A <sup>F</sup>  | 1.5 m        | 1230, 555A, 550A, 550, 162A, 162, 142, 136S, 135A, 131S, 130A, 128 | 1 µS/cm to 200 mS/cm  | Lab and field | 0.475 cm <sup>-1</sup>    | Epoxy/graphite | Dia - 15 mm<br>Length - 120 mm | 35/NA mm          |
| 013010A <sup>F</sup>  | 3 m          |  |                       |               |                           |                |                                |                   |
| 013005D <sup>B</sup>  | 1.5 m        |  |                       |               |                           |                |                                |                   |
| 013610 <sup>F</sup>   | 3 m          | 555A, 550A, 162A, 136S, 135A, 131S, 130A                           | 10 µS/cm to 200 mS/cm | Lab and field | 0.55 cm <sup>-1</sup>     | Epoxy/graphite | Dia - 12 mm<br>Length - 120 mm | 35/NA mm          |

## 3-Electrode Conductivity Cells

| Cat. No.              | Cable Length | Meter Compatibility | Measurement Range    | Application | Approximate Cell Constant | Cell Material | Dimensions                     | Min/Max Immersion |
|-----------------------|--------------|---------------------|----------------------|-------------|---------------------------|---------------|--------------------------------|-------------------|
| 014005 <sup>H**</sup> | 1 m          | RL060C Russell      | 0 µS/cm to 200 µS/cm | Field       | 1.0 cm <sup>-1</sup>      | Epoxy/steel   | Dia - 13 mm<br>Length - 120 mm | 25/120 mm         |

## 2-Electrode Conductivity Cells

| Cat. No.               | Cable Length | Meter Compatibility                              | Measurement Range       | Application   | Approximate Cell Constant | Cell Material              | Dimensions  | Min/Max Immersion |
|------------------------|--------------|--|-------------------------|---|---------------------------|----------------------------|---|-------------------|
| 013016MD <sup>A</sup>  | 1.5 m        | Star Series                                      | 0.01 µS/cm to 300 µS/cm | Boiler feed water, ultra-pure water<br>Includes flow cell                         | 0.1 cm <sup>-1</sup>      | Steel, V4A                 | Dia - 13 mm<br>Length - 120 mm<br>Flow cell volume - 8-12 mL            | 35/110 mm         |
| 013016A <sup>F</sup>   | 1 m          | 555A, 550A, 162A, 136S, 135A, 131S, 130A         |                         |   |                           |                            |   |                   |
| 013016D <sup>B</sup>   | 1 m          | 150Aplus, 145Aplus, 125Aplus, 115Aplus, 105Aplus |                         |   |                           |                            |   |                   |
| 011510MD <sup>A</sup>  | 3 m          | Star Series                                      | 10 µS/cm to 200 mS/cm   | Lab and Field   | 1.0 cm <sup>-1</sup>      | Epoxy/graphite             | Dia - 18 mm<br>Length - 134 mm  | 35/NA mm          |
| 011510-WA <sup>B</sup> | 3 m          | 150Aplus, 145Aplus, 125Aplus, 115Aplus, 105Aplus |                         |   |                           |                            |   |                   |
| 018020MD <sup>A</sup>  | 1.5 m        | Star Series                                      | 10 µS/cm to 2000 mS/cm  | High electrolyte concentrations, acids, lyes, industrial process water, sea water | 10 cm <sup>-1</sup>       | Glass/platinum, platinized | Dia - 16 mm<br>Length - 115 mm  | 55/110 mm         |
| 011050MD <sup>A</sup>  | 1.5 m        | Star Series                                      | 1 µS/cm to 20 mS/cm     | Lab and Field   | 1.0 cm <sup>-1</sup>      | Epoxy/platinum, platinized | Dia - 12 mm<br>Length - 120 mm  | 20/90 mm          |
| 011050 <sup>B</sup>    | 1 m          | 150Aplus, 145Aplus, 125Aplus, 115Aplus, 05Aplus  |                         |   |                           |                            |   |                   |
| 011020 <sup>B</sup>    | 1 m          | 150Aplus, 145Aplus, 125Aplus, 115Aplus, 05Aplus  | 0.1 µS/cm to 100 µS/cm  | Boiler feed water, ultra-pure water   | 0.1 cm <sup>-1</sup>      | Glass/platinum, platinized | Tip dia - 17 mm<br>Tip length - 22 mm<br>Dia - 13 mm<br>Length - 120 mm | 25/120 mm         |
| 011020A <sup>F</sup>   | 1 m          | 555A, 550A, 162A, 136S, 135A, 131S, 130A         |                         |   |                           |                            |   |                   |
| 011010 <sup>B</sup>    | 1 m          | 150Aplus, 145Aplus, 125Aplus, 115Aplus, 05Aplus  | 1 µS/cm to 200 mS/cm    | Lab   | 1.0 cm <sup>-1</sup>      | Glass/platinum, platinized | Dia - 13 mm<br>Length - 120 mm  | 25/120 mm         |
| 011010A <sup>F</sup>   | 1 m          | 555A, 550A, 162A, 136S, 135A, 131S, 130A         |                         |   |                           |                            |   |                   |



### Key Information

- A** MiniDIN connector (Star)    **B** 8 Pin DIN connector (A+ Series)
- F** 8 Pin Waterproof DIN connector (A Series)
- H** BNC and 2.5 mm Phono Jack connector (Russell)
- \*Conductivity cell does not have temperature compensation
- \*\*3-Electrode Conductivity Cell

## Thermo Scientific Orion Conductivity Standards and Accessories



| Cat. No. | Description   |
|----------|---|
| 011008   | 100 µS/cm conductivity/TDS standard, 5 x 60 mL  |
| 01100910 | 147 µS/cm conductivity standard, 10 pouches   |
| 011007   | 1413 µS/cm conductivity/TDS standard, 5 x 60 mL   |
| 01100710 | 1413 µS/cm conductivity/TDS standard, 10 pouches  |
| 011006   | 12.9 mS/cm conductivity/TDS standard, 5 x 60 mL   |
| 01100610 | 12.9 mS/cm conductivity/TDS standard, 10 pouches  |
| 011005   | 111.9 mS/cm conductivity standard, 5 x 60 mL  |
| 01100510 | 111.9 mS/cm conductivity standard, 10 pouches   |
| 990106   | 0.1 M KCl conductivity standard, 475 mL   |
| 011001   | Conditioning solution for 011050, 011050A, and 011050MD conductivity cells  |
| 1010001  | Conductivity calibration resistor kit for Orion Star and Orion Star A Series conductivity meters, MiniDIN                                   |
| 013017   | Replacement flow cell for 013016A, 013016D, and 013016MD  |
| 080045   | Stainless steel and plastic protective probe guard (for 013005MD, 013010MD, 013025MD, 013005A, 013010A, 013030A, 013060A, 013005D, 013010D) |
| 081045   | Plastic protective probe guard (for 013005MD, 013010MD, 013025MD, 013005A, 013010A, 013030A, 013060A, 013005D, 013010D)                     |
| 090044   | 5 electrode holder (4 X 12 mm and 1 X 15 mm) to be used with 090043 electrode swing arm and 15 mm conductivity cells                        |

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## Thermo Scientific Orion Dissolved Oxygen Probes

### Dissolved Oxygen Background

Dissolved oxygen is often referred to as DO. It is a measure of the amount of oxygen in a solution. While some gases react chemically with water to form new compounds, gases like nitrogen and oxygen dissolve in water, without a chemical reaction and exist as microscopic bubbles between water molecules.

Air has a constant percentage of oxygen, approximately 20.9 %. When air comes in contact with water, the oxygen in air will dissolve in the water. There are a number of factors that determines how much oxygen dissolves in water:

- Is there sufficient time and adequate mixing to fully saturate the water
- Are substances present in the water that consume the oxygen
- **Water Temperature:** The solubility of oxygen reduces as temperature increases. Therefore the colder the water, the more dissolved oxygen it contains
- **Air Pressure:** As atmospheric pressure decreases with altitude, the amount of dissolved oxygen in water decreases
- **Salt Content:** The amount of dissolved oxygen increases as salinity decreases. Therefore freshwater holds more oxygen than saltwater

Membrane electrodes have been used for a many years to measure DO in water but optical DO probes are becoming more widely used as they offer a number of benefits to the user.

### BOD Background

BOD (Biochemical Oxygen Demand) analysis is typically performed in wastewater plants. This analysis determines the amount of oxygen that microorganisms consume from water when they break down organic matter. The results of this analysis calculate the degree of water pollution and effectiveness of water treatment at wastewater or sewage plants. Properly treated wastewater will have a greatly reduced BOD value when being discharged from a treatment facility compared to when entering.

### Calibration

Calibration of polarographic or RDO optical DO probes can quickly and easily be performed using the water-saturated air method. DO probes are placed in a moist calibration sleeve. Under equilibrium, the partial pressure of oxygen in air-saturated water is equal to the partial pressure of oxygen in water-saturated air. Therefore, a DO probe calibrated in water-saturated air will read the partial pressure of oxygen in water samples. For low concentration samples, a second calibration with a zero standard is recommended.

### Storage

For storage of dissolved oxygen probes, they should be kept in a moist calibration sleeve. Polarographic probes should remain connected to the meter or it will need to be polarized again. For long term storage of polarographic probes, they should be disconnected from the meter, with the membrane cap removed and the sensor rinsed and kept dry.

Thermo Scientific Orion DO probes have calibration sleeves that can be used to protect the electrode between measurements as well as to perform calibrations. Protective guards are also available that will help protect the probe during field use and add weight to the probe to help submerge it when required.

### RDO vs. Polarographic

Polarographic DO probes are often referred to as the Clark cell after it's founder, Dr. Clark, and have been around for over 50 years. Polarographic probes require a voltage to operate from an external source such as your meter and require a polarization period before use. Optical dissolved oxygen is a newer method with some advantages over polarographic probes. There are a number of differences between the 2 measurements and you should evaluate your requirements when choosing which technology to use.

### Differences Between Thermo Scientific Orion Polarographic DO and Optical DO

|                           | Polarographic Probe  | Optical Probe  |
|---------------------------|--|--|
| <b>Maintenance</b>        | Replace electrolyte and polish cathode ~ every 2 months. Clean probe as needed | Clean, probe, cap and optical window as needed   |
| <b>Storage</b>            | In moist calibration sleeve, long term, remove membrane cap and store dry      | In moist calibration sleeve  |
| <b>Membrane</b>           | Change as needed, ~ every 2 months   | Must be replaced every 365 days – do not use with solutions that contain organic solvents  |
| <b>Electrolyte</b>        | Change as needed, ~ every 2 months   | None required  |
| <b>Warm-Time Required</b> | Required if just connected to meter (30-60 minutes)                            | None required  |
| <b>Stirring</b>           | Required   | Not necessary  |
| <b>Interferences</b>      | Ozone, sulfides, sulfur dioxide, nitrous oxide and carbon monoxide             | Alcohols greater than 5 %, hydrogen peroxide greater than 3 %, sodium hypochlorite greater than 3 %, gaseous sulfur dioxide and gaseous chlorine |

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 for more product information.



## Thermo Scientific Orion RDO Optical Dissolved Oxygen Probes

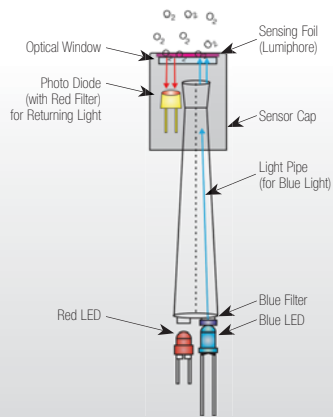
RDO technology meets the requirements of ASTM D888-05 Method C  
Measuring dissolved oxygen with a luminescence-based sensor

**Optical dissolved oxygen is a new technology with many advantages that is rapidly gaining acceptance.**

The Thermo Scientific Orion RDO® probe provides reliable measurements, no warm up time, no stirring, no maintenance (membranes or solution), no thermal shock and less interferences. The sensor cap requires easy annual replacement. The optical sensor cap is durable, able to withstand harsh environments without degradation or effect on performance. The cap has minimal hydration effects and is not prone to photo bleaching. Calibration information is stored in the sensor cap enhancing the ease of use.

All Thermo Scientific RDO probes come with a stainless steel guard and calibration sleeve and are intended for field use.

### Optical Sensor/Luminescence-Based Dissolved Oxygen Sensor



**Optical Probe/Luminescence-based Dissolved Oxygen (LDO) – Newest technology that monitors time to quench an excited lumiphore, which is inversely proportional to the concentration of oxygen**

**Rugged, low maintenance field probe**



**No membranes to change  
Sensor cap replaced annually**

| Cat. No.                 | 087010MD   | 087020MD   | 087030MD  | 087050MD  | 087100MD  |
|--------------------------|--|--|---|---|---|
| <b>Description</b>       | Rugged dissolved oxygen probe with 3 meter cable             | Rugged dissolved oxygen probe with 6 meter cable | Rugged dissolved oxygen probe with 10 meter cable | Rugged dissolved oxygen probe with 15 meter cable | Rugged dissolved oxygen probe with 30 meter cable |
| <b>Accuracy</b>          | ±0.1 mg/L from 0 to 8 mg/mL and ±0.2 mg/L from 8 to 20 mg/mL |  |   |   |   |
| <b>Response Time</b>     | T90, 30 seconds and T95, 60 seconds                          |  |   |   |   |
| <b>Operating Range</b>   | 0 to 20 mg/L and 0 to 200 %                                  |  |   |   |   |
| <b>Temperature Range</b> | 0 to 50 °C   |  |   |   |   |

| Cat. No. | Recommended Accessories                         |
|----------|---|
| 087001   | Replacement RDO sensor cap                      |
| 087002   | Stainless steel protective guard, for RDO probe |
| 087003   | Calibration sleeve for RDO probe                |

**For connector type information, refer to the RDO meter section to determine the correct meter for your application.**



## Thermo Scientific Orion Dissolved Oxygen Probe Families

A complete line of polarographic dissolved oxygen probes are available for BOD (Biochemical Oxygen Demand) analysis, beer and wine testing, rugged field applications, and water and wastewater analysis. All DO probes feature automatic temperature compensation and convenient screw on membrane caps that reduce probe servicing time and eliminate assembly problems.

The AUTO-STIR probe fits directly into a standard BOD bottle and has a built-in stirrer. This probe offers convenience, quick response, and long life between servicing.

See page 110 for a complete offering of accessories.

**Durable and accurate DO probes for the lab or field**



- 083005MD <sup>A</sup>  
083010MD <sup>A</sup>  
083025MD <sup>A</sup>  
083060MD <sup>A</sup>
- For lab and field applications
  - Cable lengths from 1.5 to 20 meters

**AUTO-STIR™ probe for BOD applications**



- 086030MD <sup>A, C</sup>  
086020A <sup>G</sup>
- For lab applications
  - Self-stirring with one-touch control

**Reliable DO probes for the lab or field**



- 081010MD <sup>A</sup>
- For lab and field applications
  - Rugged epoxy body

**Rugged DO probes plus probe guard**



- 080510MD <sup>A</sup>
- For field applications
  - Includes probe guard

**Convert any pH meter into a DO meter**



- 970899WP <sup>1</sup>
- For lab applications
  - Works on pH meters with BNC



1 BNC Waterproof



A MiniDIN



C 3.5 mm Phono Tip Stirrer Jack



G 13 Pin DIN

### Key Information

**1** BNC Waterproof Connector

**A** MiniDIN Connector

**C** 3.5 mm Phono Tip Stirrer Jack Connector

**G** 13 Pin DIN Connector

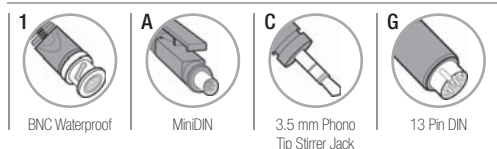


## Thermo Scientific Orion Dissolved Oxygen Probe Selection Guide

### Polarographic Dissolved Oxygen Probes

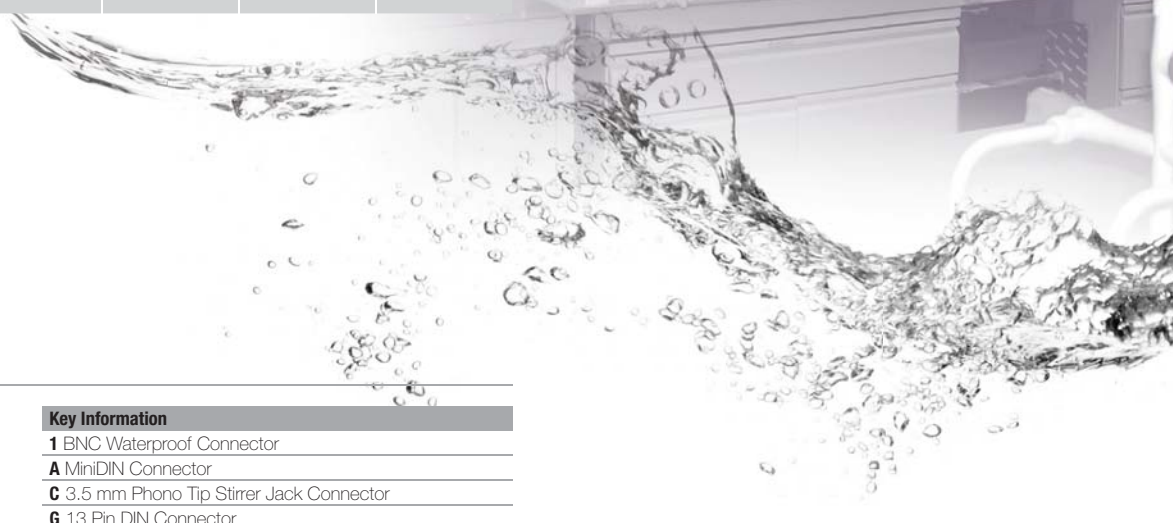
| Cat. No.                       | Cable Length | Meter Compatibility          | Application        | Response Time   | Minimum Sample Flow | Oxygen Consumption                       | Maximum Allowed Overpressure | Sample Temperature |
|--------------------------------|--------------|------------------------------|--------------------|---|---------------------|--|------------------------------|--------------------|
| <b>083005MD</b> <sup>A</sup>   | 1.5 m        | Star series                  | Laboratory / field | 90 % of final value in 10 seconds;<br>95 % of final value in 15 seconds;<br>99 % of final value in 60 seconds | 10 cm/sec           | 0.008 µg/h (mg/L) <sup>-1</sup> at 20 °C | 6 BAR                        | 0 to 50 °C         |
| <b>083010MD</b> <sup>A</sup>   | 3 m          | Star series                  |                    |   |                     |  |                              |                    |
| <b>083025MD</b> <sup>A</sup>   | 10 m         | Star series                  |                    |   |                     |  |                              |                    |
| <b>083060MD</b> <sup>A</sup>   | 20 m         | Star series                  |                    |   |                     |  |                              |                    |
| <b>086020A</b> <sup>E</sup>    | 2 m          | 862A                         | Laboratory         | 90 % of final value in 10 seconds;<br>95 % of final value in 15 seconds;<br>99 % of final value in 60 seconds | 10 cm/sec           | 0.008 µg/h (mg/L) <sup>-1</sup> at 20 °C | 6 BAR                        | 0 to 50 °C         |
| <b>086030MD</b> <sup>A,C</sup> | 2 m          | Star series, benchtop models |                    |   |                     |  |                              |                    |
| <b>081010MD</b> <sup>A</sup>   | 3 m          | Star Series                  | Laboratory / field | 90 % of final value in 10 seconds;<br>95 % of final value in 16 seconds;<br>99 % of final value in 60 seconds | 20 cm/sec           | –  | –                            | 0 to 50 °C         |
| <b>080510MD</b> <sup>A</sup>   | 3 m          | Star Series                  | Field              | 90 % of final value in 10 seconds;<br>95 % of final value in 18 seconds;<br>99 % of final value in 60 seconds | 10 cm/sec           | 0.008 µg/h (mg/L) <sup>-1</sup> at 20 °C | 10 BAR                       | 0 to 50 °C         |
| <b>970899WP</b> <sup>**</sup>  | 1 m          | pH meters with BNC connector | Laboratory         | 96 % response in less than 30 seconds between oxygen-free and air saturated water at 22 °C                    | –                   | 0.1 mg/hr                                | –                            | 0 to 45 °C         |

\*Accuracy – ±0.05 ppm or 2 % of reading, whichever is greater  
 Battery Life – One year based on 4 hours/day operation





| Temperature Sensor   | Drift                       | Electrolyte lifetime | Storage Temperature | Membrane Cap and Solution  | Maintenance Kit   |
|--|-----------------------------|----------------------|---------------------|--|---|
| Dual, thermally separated  | Approximately 0.1 % per day | 180 days             | -5 to 50 °C         | Membrane cap - 080515<br>Solution - 080514   | 080513  |
| Dual, thermally separated  | Approximately 0.1 % per day | 180 days             | -5 to 50 °C         | Membrane cap - 080515<br>Solution - 080514   | 080513  |
| Single thermally separated   | < 1 % per day               | 180 days             | -5 to 50 °C         | Membrane cap - 081003<br>Solution - 080514   | 080113  |
| Dual, thermally separated (080510MD has a single temperature sensor) | Approximately 0.1 % per day | 180 days             | -5 to 50 °C         | Membrane cap for 080510MD - 081003<br>Membrane cap for 081010F & 083010F - 080515<br>Solution - 080514 | Kit for 080510MD - 080113<br><br>Kit for 081010F & 083010F - 080513 |
| Dual, thermally separated  | –                           | –                    | –                   | Pre-filled membrane cap - 970801   | –   |



**Key Information**

**1** BNC Waterproof Connector

**A** MiniDIN Connector

**C** 3.5 mm Phono Tip Stirrer Jack Connector

**G** 13 Pin DIN Connector



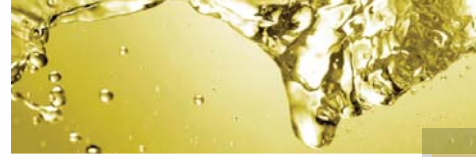
## Polarographic Dissolved Oxygen Solutions and Accessories

| Cat. No. | Description  |
|----------|--|
| 087001   | Replacement RDO optical cap  |
| 087002   | Stainless steel protective probe guard for RDO probes  |
| 087003   | Calibration sleeve for RDO probes  |
| 080513   | Maintenance kit, includes electrolyte solution, polishing disk and 2 membrane caps for 083005MD, 083010MD, 083025MD, 083060MD, 086030MD, 083005A, 083010A, 083005D, 086020A, 081010F |
| 080113   | Maintenance kit, includes electrolyte solution, polishing disk and 2 membrane caps for 080510MD, 081010MD, 081010  |
| 080515   | 1 membrane cap for 083005MD, 083010MD, 083025MD, 083060MD, 086030MD, 083005A, 083010A, 083005D, 086020A, 081010F   |
| 081003   | 3 membrane caps for 080510MD, 081010MD, 081010   |
| 970801   | 1 pre-filled membrane cap for 970899WP, 970800   |
| 080514   | Polarographic electrolyte solution for 083005MD, 083010MD, 083025MD, 083060MD, 086030MD, 083005A, 083010A, 083005D, 086020A, 081010F, 080510MD, 081010MD, 081010                     |
| 080017   | Calibration sleeve for all DO probes excluding AUTO-STIR probes and RDO probe  |
| 086021A  | Calibration chamber/stand for 086020A, 086030MD AUTO-STIR probes   |
| 080360   | BOD adapter for 083005MD, 083010MD, 083025MD, 083060MD, 083005A, 083010A, 083005D  |
| 080160   | BOD adapter for 081010MD, 081010   |
| 970802   | BOD stir funnel for 970899WP, 970800   |
| 970803   | 2 batteries for 970899WP, 970800   |
| 080045   | Stainless steel and plastic protective probe guard for 080510MD, 083005MD, 083010MD, 083025MD, 083060MD, 083005A, 083005D, 083010A   |
| 081045   | Plastic protective probe guard for 080510MD, 083005MD, 083010MD, 083025MD, 083060MD, 083005A, 083005D, 083010A   |

Visit the WAI Online Library on [www.thermoscientific.com/water](http://www.thermoscientific.com/water) for the most up-to-date MSDS and Certificate of Analysis files for Orion solutions.







## Colorimetry, Turbidity and UV-Vis Spectrophotometry – The Optical Measurements

Colorimeters and Turbidity meters both employ optical measurements. Optical measurements use light to quantify the amount of a colored or cloudy sample. Colorimeters are used to measure the concentration of a sample component. Turbidity meters can determine how cloudy the sample is and report a number value for the turbidity.

Colorimetric measurements use a small light source to pass a narrow band of light straight through a reacted test sample in a vial. The light beam exiting the sample vial is collected in a detector at 180 degrees from the initial beam. The detector reading that was measured is converted to a concentration for that specific test. Some single parameter colorimeters have only one measurement performed. Multi-parameter meters require the user to select the appropriate method number to match the test and reagent type being used.

These tests allow you to expand your testing capabilities for species that are not detectable by pH, DO, Conductivity and Ion Selective Electrode (ISE) electrochemical methods. Colorimeters require the use of a reagent in most cases. The reagent will react with the targeted component of the sample. The user can then measure the reacted sample in their colorimeter to determine the concentration of the component in that sample. The sample result is compared to a programmed calibration curve in the meter of reacted, known standard values. The colorimeter measurement can be seen on the display.

Globally, there are many regulations that are in place to ensure our drinking water is safe to drink and our wastewater will not alter or destroy our local ecosystems and oceans. Regulations vary due to the sample components in the area. A disinfectant, used to purify water, is commonly tested by colorimetry. In groundwater that is the source of a drinking water supply, there could be underground iron deposits creating a tint of color to the water. The water may be checked for iron level and also the chemical form of that iron. Water components present that increase maintenance frequency may also be tested regularly to monitor and maximize time online.

Many test reagents are available for measuring parameters that are reported as required on regulatory compliance permits.

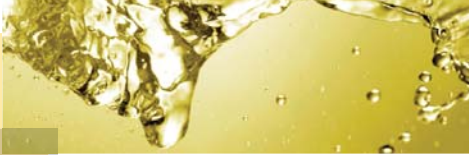
Turbidity is a measurement of “cloudiness” or particulates floating in the sample. The more particles present, the higher the sample’s turbidity. Low turbidity sample particles can often not be seen. An instrument is needed to quantify the turbidity present. Turbidity meters require standards to calibrate the meter periodically and to check the calibration by a read-back of the standards. Orion AQ4500 Method is approved for Drinking Water and Wastewater reporting and also satisfies the ISO 7027 measurement reporting with our ISO Nephelometric mode.

Visit our online library at [www.thermoscientific.com/WAI-Library](http://www.thermoscientific.com/WAI-Library) to review the colorimetry and turbidity approvals. You will find our newly approved Orion AQ4500 Drinking Water and Wastewater turbidity methods. Our ISO 7027 method being used around the world. We have posted many application notes and briefs to assist you with your testing.



Please visit [www.thermoscientific.com/waterlibrary](http://www.thermoscientific.com/waterlibrary) for more product information.





## Accurate Results, Within Your Reach

We've got you covered

It's been said that anything worth doing is worth doing right. At Thermo Fisher Scientific we combine intelligent design with quality craftsmanship to give you the tools you need for effective water analysis, whether in the lab or in the field. In essence, we do our job right, so you can do the same.

Recognized worldwide, our water analysis instruments combine accuracy and precision with intuitive operation, dependability and ease of use. Our products are backed by substantial research and development, built with an unmatched standard of excellence.

### Spectrophotometers – Lab Intelligence

A good lab depends on expert equipment.

Thermo Scientific™ Orion™ AquaMate™ Spectrophotometers are the ideal instrument for water and wastewater analysis laboratories, combining innovative technology, compact design and accurate results.

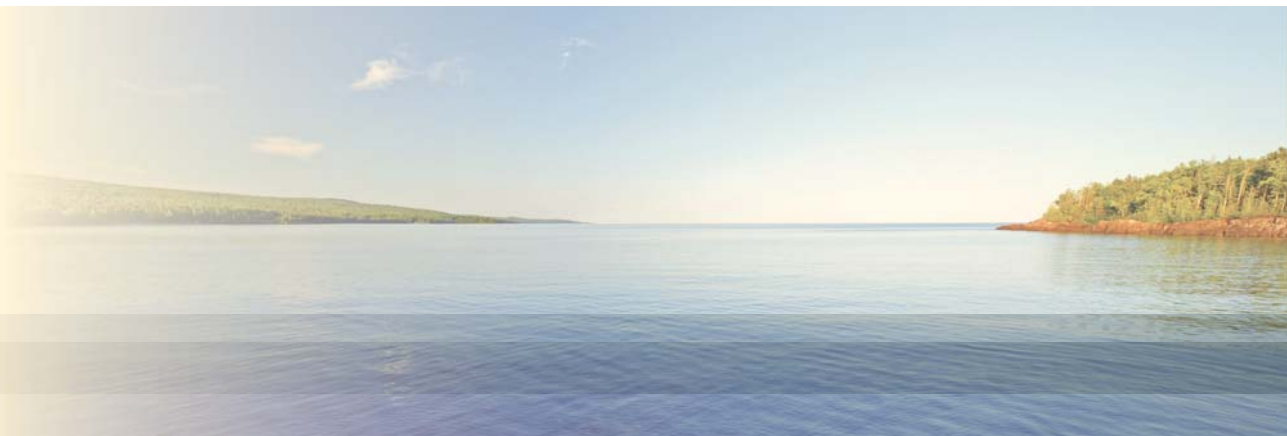
- Spectrophotometers that meet your requirements – choose the AquaMate 8000 UV-Vis or AquaMate 7000 Vis
- Simple and efficient sample analysis using over 260 preprogrammed methods for common reagent chemistries
- One-point calibration adjustment feature ensures the highest accuracy from preprogrammed methods
- User customizable methods for absorbance, % transmittance and concentration testing
- Performance verification tests ensure wavelength accuracy and instrument functionality

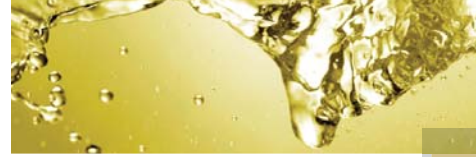
### Colorimeters / Turbidity Meters – Fieldwork Essentials

Portable design with uncompromised performances.

Thermo Scientific Orion Colorimeters and Turbidity Meters are accurate, dependable and easy to use, with handheld portability, preprogrammed methods, optimum wavelengths, user-friendly displays, and easy calibration.

- Rugged, handheld portability and waterproof options for fieldwork convenience
- User-friendly interface for quick and easy results processing
- Compatibility with several tests and reagent types
- Approvals and regulatory requirements met in many industries





### Orion AquaMate 7000 Vis Spectrophotometer

The cost-effective solution for accurate, visible-only measurements

The AquaMate 7000 Vis Spectrophotometer offers 325 to 1100 nm selectable wavelengths and 5 nm spectral bandwidth and is ideal for most routine concentration measurements. For its relatively small footprint and lightweight design, it boasts numerous features at a competitive price. The intuitive user interface and simple, single-beam optical geometry generate accurate results.



AquaMate 7000

### Orion AquaMate 8000 UV-Vis Spectrophotometer

The ideal instrument for extensive, full wavelength measurement options

The AquaMate 8000 UV-Vis Spectrophotometer offers 190 to 1100 nm selectable wavelengths and 1.8 nm spectral bandwidth and delivers unsurpassed data quality throughout the entire UV to near-IR region of the spectrum. A dual-beam optical geometry and high-intensity, instant-on xenon lamp are utilized for accurate measurements and up to seven years of maintenance-free operation. Superior signal-to-noise performance and fast wavelength scanning technology allow high-quality spectral data to be acquired quickly and reliably.



AquaMate 8000

### Thermo Scientific offers a full line of Orion Colorimetry and Turbidity Meters

Using optical measurement, Colorimeters measure the concentration of a sample component and Turbidity Meters determine how cloudy a sample is.

Regulations ensure our drinking water is safe and our wastewater will not alter or destroy local ecosystems and oceans. Disinfectants, used to purify water, are commonly tested by colorimetry. Groundwater that is the source of a drinking water supply may be checked for iron level and the chemical form of that iron. Water components that increase maintenance frequency may be tested regularly to monitor and maximize time online. Many test reagents are available for measuring parameters that are reported as required on regulatory compliance permits.

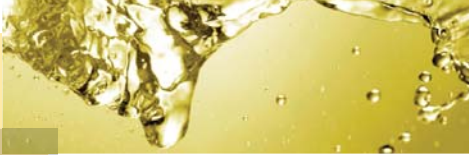


AQ3070 Meter

AQ3700 Meter

AQ4000 Meter





## Thermo Scientific Orion AquaMate Spectrophotometers

### AquaMate 7000 & 8000 Meters

Orion AquaMate Spectrophotometers include over 260 preprogrammed methods for easy and convenient measurements using Orion AQUAfast reagent chemistries or chemistries from other key reagent manufacturers. Methods are stored on the USB memory stick, so they can be added or removed from the instrument as needed. The 3-position holder allows flexibility in vial sizes with an adjustable holder for 13 to 25 mm round vials, a holder for 20 or 50 mm rectangular vials and a holder for 10 mm square vials. AquaMate Spectrophotometers also utilize performance verification tests to ensure wavelength accuracy and instrument functionality.

#### AquaMate 7000 Vis Spectrophotometer

- Selectable wavelengths in the visible range of 325 to 1100 nm
- Single-beam optics and Tungsten-halogen lamp
- 5.0 nm spectral bandwidth, ideal for most routine concentration measurements
- Simple operation, expanded functionality and great value
- 1 year warranty

#### AquaMate 8000 UV-Vis Spectrophotometer

- Selectable wavelengths in the UV and visible range of 190 to 1100 nm
- Dual-beam optics utilizing a Xenon Flash lamp for an average of five years of maintenance-free performance
- 1.8 nm spectral bandwidth for optimal resolution
- Enhanced wavelength scanning technology that acquires high-quality spectral data at speeds up to 4,200 nm per minute
- 1 year warranty

Depending on the needs of your lab, choose the AquaMate 7000 Vis Spectrophotometer for 325 to 1100 nm wavelengths or choose the AquaMate 8000 UV-Vis with full 190 to 1100 nm wavelengths for a greater range of measurement options.

Use your current chemistry reagents – no need to change. The AquaMate preprogrammed methods are compatible with many leading reagent manufacturers.





## Specifications

| Specifications                         |                          | AquaMate 8000 UV-Vis Spectrophotometer   | AquaMate 7000 Vis Spectrophotometer  |
|--|--------------------------|--|--|
| <b>Optical Design</b>                  |                          | Dual beam – internal reference detector  | Single beam  |
| <b>Spectral Bandwidth</b>              |                          | 1.8 nm   | 5.0 nm   |
| <b>Light Source (Typical Lifetime)</b> |                          | Xenon flash lamp (5 years)   | Tungsten-halogen lamp (1000 hours)   |
| <b>Detector</b>                        |                          | Dual silicon photodiodes   | Silicon photodiode   |
| <b>Wavelength</b>                      | <b>Range</b>             | 190 to 1100 nm   | 325 to 1100 nm   |
|  | <b>Accuracy</b>          | ±1.0 nm  | ±1.0 nm  |
|  | <b>Repeatability</b>     | ±0.5 nm  | ±0.5 nm  |
|  | <b>Slew Speed</b>        | 11,000 nm/min  | 11,000 nm/min  |
|  | <b>Scanning Speed</b>    | 10 to 4,200 nm/min   | 10 to 4,200 nm/min   |
|  | <b>Data Interval</b>     | 0.2, 0.5, 1.0, 2.0, 3.0, 5.0 nm  | 1.0, 2.0, 3.0, 5.0 nm  |
| <b>Photometric</b>                     | <b>Measurement Modes</b> | Absorbance, % transmittance, concentration   | Absorbance, % transmittance, concentration   |
|  | <b>Range</b>             | -0.5 to 5.0 A ;<br>-1.5 to 125 %T ;<br>±9999 C   | -0.1 to 3.0 A ;<br>-0.3 to 125 %T ;<br>±9999 C   |
|  | <b>Linearity</b>         | Up to 3.5 A at 260 nm  | Up to 3.0 A at 340 nm  |
|  | <b>Accuracy</b>          | ±0.005 A at 1.0 A,<br><0.00025 at 0.0 A  | 0.5 % or ±0.005 A,<br>whichever is greater<br>up to 2 A  |
|  | <b>Noise</b>             | <0.00050 at 1.0 A,<br><0.00080 at 2.0 A<br>RMS at 260 nm   | <0.001 A at 0.0 A,<br><0.002 A at 2.0 A<br>Peak-to peak at<br>340 nm   |
|  | <b>Drift</b>             | <0.0005 A/hr   | 0.002 A/hr<br>after warm-up  |
| <b>Stray Light</b>                     |                          | <0.08 %T at 220 nm and 340 nm,<br><0.1 %T at 340 nm and 400 nm,<br><1.0 %T at 198 nm   | <0.08 %T at 220 nm and 340 nm,<br><0.1 %T at 340 nm and 400 nm,<br><1.0 %T at 198 nm   |
| <b>Display</b>                         |                          | Graphical with LCD backlight – 9.7 x 7.1 cm (3.8 x 2.8 in)   | Graphical with LCD backlight – 9.7 x 7.1 cm (3.8 x 2.8 in)   |
| <b>Keypad</b>                          |                          | Sealed membrane with tactile response keys   | Sealed membrane with tactile response keys   |
| <b>Connectivity</b>                    |                          | USB type A port for USB stick (front panel),<br>USB type B port for computer (rear panel),<br>USB type A port for printer (rear panel) | USB type A port for USB stick (front panel),<br>USB type B port for computer (rear panel),<br>USB type A port for printer (rear panel) |
| <b>Dimensions</b>                      |                          | 30 W x 40 D x 25 H cm (11.8 x 15.7 x 9.8 in)   | 30 W x 40 D x 25 H cm (11.8 x 15.7 x 9.8 in)   |
| <b>Weight</b>                          |                          | 8.6 kg (19 lb.)  | 8.6 kg (19 lb.)  |
| <b>Power Requirements</b>              |                          | 100 to 240 V ;<br>50 to 60 Hz  | 100 to 240 V ;<br>50 to 60 Hz  |

## Ordering Information

| Cat. No.      | Description   |
|---------------|---|
| <b>AQ8000</b> | AquaMate 8000 UV-Vis Spectrophotometer, includes methods on USB memory stick, 6-position vial holder turret, 3-position vial holder turret, 1-position vial holder turret, user documentation, dust cover, USB cable, and 110 V, 220 V, 240 V power cords |
| <b>AQ7000</b> | AquaMate 7000 Vis Spectrophotometer, includes methods on USB memory stick, 3-position vial holder turret, user documentation, dust cover, USB cable, and 110 V, 220 V, 240 V power cords  |
| <b>AQ006C</b> | AquaMate 6-position vial holder turret for six 10 mm square vials   |
| <b>AQ003C</b> | AquaMate 3-position vial holder turret for one adjustable 13-25 mm round vial, one adjustable 20-50 mm rectangular vial and one 10 mm square vial   |
| <b>AQ001C</b> | AquaMate 1-position vial holder turret for one 10 mm square vial  |
| <b>AQ0USB</b> | AquaMate methods, USB memory stick  |
| <b>AQCHNV</b> | AquaMate power cord, China, Australia, New Zealand plug   |
| <b>AQ240V</b> | AquaMate power cord, 240 V UK, Singapore plug   |
| <b>AQ220V</b> | AquaMate power cord, 220 V Euro plug  |
| <b>AQ110V</b> | AquaMate power cord, 110 V US, Japan plug   |
| <b>AC2V24</b> | 24 mm round vials, 12 pack  |

**Note:** When ordering the AQ8000 or AQ7000 instruments, the AQCHNV power cord needs to be ordered separately.

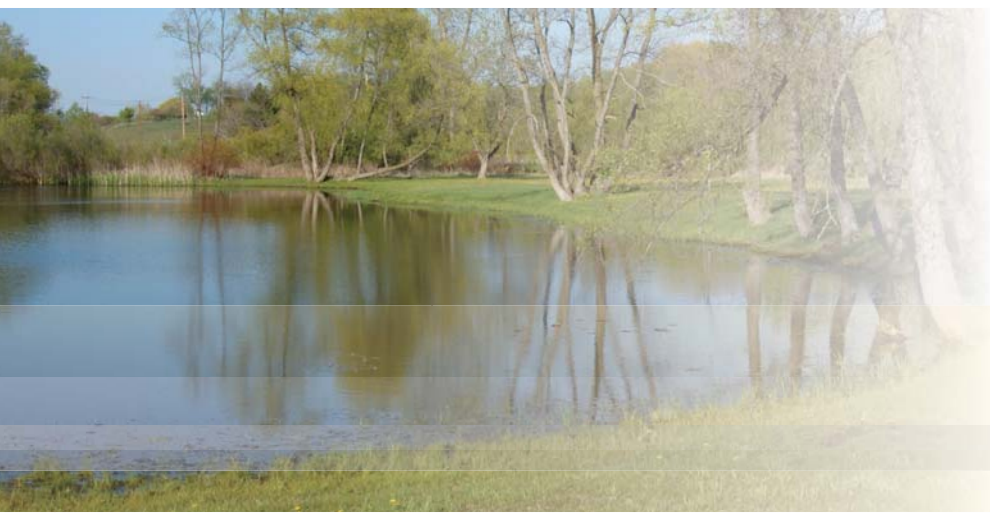
## Thermo Scientific Orion Colorimetry and Turbidity Markets

You can find colorimetry and turbidity measurements in a wide variety of industries. The tests are quick and easy and often cost less than alternative methods. Thermo Scientific Orion colorimetry and turbidity products have approvals and meet the regulatory requirements in many industries. We also have several types of tests for common parameters to give you choices of reagent types, ranges and simplicity to fit your requirements. The reagent table on pages 124 and 125 highlights our EPA approved, accepted and equivalent methods.

### Commonly Tested Parameters by Market

| Agriculture | Beverage         | Drinking Water   | Environmental | Wastewater | Aquaculture | Boiler/Cooling Water | Chemical  |
|-------------|------------------|------------------|---------------|------------|-------------|----------------------|-----------|
| Ammonia     | Bromine          | Aluminum         | Ammonia       | Aluminum   | Ammonia     | Aluminum             | Aluminum  |
| Chlorine    | Chlorine         | Ammonia          | Bromine       | Ammonia    | Bromine     | Ammonia              | Ammonia   |
| Iron        | Chlorine Dioxide | Bromine          | Chlorine      | Bromine    | Chlorine    | Bromine              | Copper    |
| Nitrate     | Copper           | Chloride         | COD           | Chlorine   | Copper      | Chlorine             | Iron      |
| Nitrite     | Fluoride         | Chlorine         | Copper        | COD        | Nitrate     | Chlorine dioxide     | Nitrate   |
| Oxygen      | Iron             | Chlorine Dioxide | Iron          | Copper     | Nitrite     | Copper               | Nitrite   |
| pH          | Manganese        | Copper           | Nitrate       | Iron       | Oxygen      | Hydrazine            | pH        |
| Phosphate   | Nitrate          | Fluoride         | Nitrite       | Manganese  | Ozone       | Iron                 | Phosphate |
| Silica      | Oxygen           | Iron             | Ozone         | Nitrate    | pH          | Nitrate              | Silica    |
| Sulfate     | pH               | Manganese        | pH            | Nitrite    | Phosphate   | Nitrite              | Sulfate   |
| Turbidity   | Phosphate        | Nitrate          | Silica        | Oxygen     | Turbidity   | Ozone                | Sulfide   |
|             | Silica           | Nitrite          | Sulfate       | Ozone      |             | Oxygen               | Zinc      |
|             | Turbidity        | pH               | Sulfide       | pH         |             | Phosphate            |           |
|             |                  | Phosphate        | Zinc          | Phosphate  |             | pH                   |           |
|             |                  | Ozone            |               | Sulfate    |             | Silica               |           |
|             |                  | Silica           |               | Sulfide    |             | Zinc                 |           |
|             |                  | Sulfate          |               | Zinc       |             |                      |           |
|             |                  | Sulfide          |               | Turbidity  |             |                      |           |
|             |                  | Zinc             |               |            |             |                      |           |
|             |                  | Turbidity        |               |            |             |                      |           |

| Metal Plating | Mining    | Pulp & Paper     | Solid Waste/Sludge | Petroleum | Pharmaceutical/Biotech | Semi-conductor |
|---------------|-----------|------------------|--------------------|-----------|------------------------|----------------|
| Copper        | Copper    | Aluminum         | Aluminum           | Ammonia   | Chlorine               | Aluminum       |
| Iron          | Cyanide   | Chlorine         | Copper             | Chlorine  | Cyanide                | Copper         |
| pH            | Iron      | Chlorine dioxide | Nitrate            | Iron      | Ozone                  | Fluoride       |
| Phosphate     | pH        | pH               | Nitrite            | Nitrate   | pH                     | pH             |
|               | Phosphate | Phosphate        | pH                 | pH        | Silica                 | Silica         |
|               | Zinc      | Silica           | Phosphate          | Sulfide   |                        |                |
|               |           | Zinc             | Zinc               |           |                        |                |





## Thermo Scientific Orion AQ3700 Colorimeter

Featuring digestion tests for nitrogen, phosphate and COD



The Orion AQ3700 is the newest addition to the colorimetry line. With over 70 pre-programmed method options, this IP67 waterproof portable meter offers liquid, powder and tablet tests for expanded ranges and test options. There are six wavelengths generated by the long life LEDs in the meter. This instrument has a graphical display that is easy to understand and can be used in English, Spanish, German, French, Italian, or Polish.

See pages 122-125 for additional AQ3700 reagents.

### Specifications

| Specifications                      | Description  |
|-------------------------------------|--|
| <b>Incident Light Source</b>        | 6 light emitting diodes (LED)  |
| <b>Wavelengths</b>                  | 430, 530, 560, 580, 610, 660 nm  |
| <b>Photometric Precision</b>        | 2 % full scale as measured with standard solutions                           |
| <b>Photometric Resolution</b>       | ±0.005 Abs   |
| <b>Software</b>                     |  |
| <b>Test Methods</b>                 | Preprogrammed with user prompts and feedback, efficient user's favorite list |
| <b>Autoranging</b>                  | Yes  |
| <b>Blank Capability</b>             | Per method   |
| <b>Test Reagent Formats</b>         | Powder, tablet, liquid, reagent reaction tubes, acid digestion tubes         |
| <b>Datalog Points</b>               | Up to 1000, time and date stamp  |
| <b>New Method Upload Capability</b> | Yes, via internal RJ45 port  |
| <b>Meter Hardware</b>               |  |
| <b>Display</b>                      | Backlit, graphic display   |
| <b>Inputs</b>                       | 12 button numeric keypad, plus 3 function keys                               |
| <b>Sample Required</b>              | 10 mL  |
| <b>Sample Cells Accepted</b>        | 24 mm sample vials; 13 mm ampoules and 16 mm tubes with included adapters    |
| <b>Outputs</b>                      | IRDA (adapter required)  |
| <b>Auto Shut Down</b>               | 20 min after last key-press, wakes to last location                          |
| <b>Power</b>                        | 4 AA batteries (>3000 tests)   |
| <b>Regulatory and Safety</b>        | CE, FCC part 15  |
| <b>Environmental Conditions</b>     | 5 to 40 °C<br>(30 to 90 % non-condensing at 30 °C)                           |
| <b>Meter Waterproof Rating</b>      | IP67   |
| <b>Warranty</b>                     | 2 years  |

### New Reagents for AQ3700

| Cat. No. | New Test                                  | Range, mg/L                       | Reagent Type                 |
|----------|---|-----------------------------------|------------------------------|
| AC2002   | Alkalinity-m/<br>Acid Demand pH 4.3       | 5 to 200/<br>0.1-4 mmol/L         | Tablet                       |
| AC3002P  | Alkalinity-p                              | 5 to 500                          | Tablet                       |
| AC4P27   | Aluminum, LR                              | 0.01 to 0.25                      | Tablet & liquid              |
| ACR012   | Ammonia, LR                               | 0.02 to 2.5                       | Powder & reaction tube       |
| ACR011   | Ammonia, HR                               | 1 to 50                           | Powder & reaction tube       |
| AC3072   | Chlorine total HR/<br>Sodium Hypochlorite | 5 to 200/<br>0.2 to 16 %<br>NaOCl | Tablet                       |
| AC3032C  | Hardness, Calcium                         | 50 to 900                         | Tablet                       |
| AC3032C2 | Hardness, Calcium<br>2 LR                 | 0 to 500                          | Tablet                       |
| AC3032T  | Hardness, total                           | 2 to 50                           | Tablet                       |
| AC4P54   | Manganese, LR                             | 0.01 to 0.7                       | Powder & liquid              |
| ACR007   | Nitrate                                   | 1.0 to 30.0                       | Powder pack & reaction tube  |
| AC4P46   | Nitrite                                   | 0.01 to 0.3                       | Powder pack                  |
| ACD004   | Nitrogen, total, LR                       | 0.5 to 25                         | Powder pack & digestion tube |
| ACD007   | Nitrogen, total, HR                       | 5 to 150                          | Powder pack & digestion tube |
| ACR095   | Phosphate, ortho                          | 0.06 to 5                         | Powder pack & reaction tube  |
| ACD095AH | Phosphate, acid<br>hydrolyzable           | 0.02 to 1.6                       | Powder pack & digestion tube |
| ACD095   | Phosphate, total                          | 0.02 to 1.1                       | Powder pack & digestion tube |
| AC3001TB | pH  | 8.0 to 9.6                        | Tablet                       |
| AC3072   | Sodium hypochlorite                       | 0.2 to 16 %<br>NaOCl              | Tablet                       |

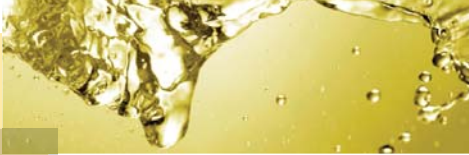
### Ordering Information

| Cat. No. | Description   |
|----------|---|
| AQ3700   | Meter kit includes AQ3700 meter, 4 batteries, 4 vials (24 mm), 3 vials (16 mm), 1 adapter each for 16 mm and 13 mm vials, carrying case, user guide with test methods, tablet tampering stir rod and brush.<br><b>Order reagents and IR adapter separately.</b> |

### Accessories for AQ3700 Meter

| Cat. No. | Description                            |
|----------|--|
| AC2V16   | Replacement 16 mm vials, package of 10 |
| AC2V24   | Replacement 24 mm vials, package of 12 |
| AC37A16  | Replacement 16 mm adapter for AQ3700   |
| AC37A13  | Replacement 13 mm adapter for AQ3700   |
| AC3R0D   | Stir rod, package of 10                |
| AC3C8R   | Cleaning brush, package of 5           |
| AC3VSK   | Meter verification check standards kit |
| AQ37IRIM | IR data transfer interface module      |

Many of our long-standing colorimetry tablet and powder reagents as well as COD tests are already programmed into the AQ3700. See pages 122-125 for additional test parameters, meter accessories, digestion supplies, and more reagent options.



## Thermo Scientific Orion AQ4000 Colorimeter

The most advanced microprocessor-based LED colorimeter on the market today!

The AQ4000 colorimeter stores up to 189 pre-programmed methods and can record 100 data points in the field with a time and date stamp. Download later to a printer or computer in the lab.

The AQ4000 colorimeter takes all the guesswork out of sample preparation with the Auto-Test™ ampoules and the exclusive Auto-ID™ feature.

Quality of the measurement is assured since the ampoules are only opened when a measurement is about to be taken.

- **Auto-ID:** Automatically identifies the species to be measured, selects the method and the wavelength plus initiates the method – no buttons to push!
- **Auto-Test Ampoules:** Pre-measured liquid reagent ampoules are specially designed to work with the AQ4000

### Selection of Display Units is Push-Button Easy

Choose from concentration, absorbance or percent transmittance. The AQ4000 accepts round vials with diameters of 13, 16 or 24 mm. Best of all, the AQ4000 carries a full two year warranty.

### Use the AQ4000 with Our Tablets or Powders

- **Tablets:** Quick dissolve tablets that are easy to add to the sample. Tablets can be used with the AQUAfast II series and AQ4000 colorimeters.
- **Powders:** Pre-measured and ready-to-use packets. Just add the packet to the sample, allow it to dissolve and then take your measurement. Many reagents meet regulatory requirements.
- **COD Reagents:** Available in three measurement ranges – low, mid and high range.

### Updating the AQ4000 with New Methods is Simple


The latest software updates are available at [www.thermoscientific.com/water](http://www.thermoscientific.com/water). A simple download procedure updates the colorimeter with the most current programs in a few quick, easy steps.

See pages 124 and 125 for reagent chemistries that you can use with the AQ4000 colorimeter.

### AQ4000 Colorimeter and Accessories

| Cat. No. | Description  |
|----------|--|
| AQ4000   | Orion IV colorimeter only (order reagents separately)                  |
| AQ40FK   | Replacement field case to carry AQ4000 meter, accessories and reagents |
| AQ4CBL   | RS232 cable for data download and software updates                     |
| AQ4ZER   | AQUAfast zero kit  |
| AC2V16   | 16 mm vials, 10 pack   |
| AC2V24   | 24 mm vials, 12 pack   |

### AQII Series Accessories

| Cat. No. | Description   |
|----------|---|
| AC2V16   | 16 mm replacement vials, 10 pack  |
| AC2V24   | 24 mm replacement vials, 12 pack  |
| AC2T24   | 24 mm replacement turbidity vials, 12 pack  |
| AC2073   |  Chlorine secondary reference standards kit for AQ2070 |



Signifies a hazardous solution.

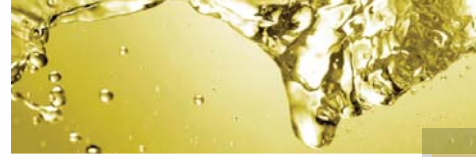
See terms and conditions for important shipping information at [www.thermoscientific.com/water](http://www.thermoscientific.com/water)

Easily create and store your own calibration curve for up to 10 new tests in the meter.



Versatile AQ4000 Meter





# Thermo Scientific Orion AQ3070 Chlorine Meter

Measures free and total chlorine for EPA reporting – and more!



AQ3070 Meter



AQ3070 Meter Kit

- EPA-approved AC4P71 free chlorine and AC4P72 total chlorine methods for drinking water and wastewater
- Single meter programmed for free chlorine, total chlorine, pH, chlorine dioxide and cyanuric acid measurements
- Additional capability for liquid pH test, chlorine dioxide and cyanuric acid – no need to purchase separate meters for additional tests
- Chlorine dioxide and cyanuric acid tablets feature long shelf lives, so they are ready when you need them

Designed with the user in mind, these small rugged IP67 portable meters have a large easy-to-read display with a very simple user interface. The expanded range for free and total chlorine measurements gives you a real number if you are out of the EPA measurement range to quickly recover your process. The results are accurate and repeatable. You save time while measuring by not having to cover and uncover the vial for each measurement. The field case keeps the meter and test supplies always ready for testing.

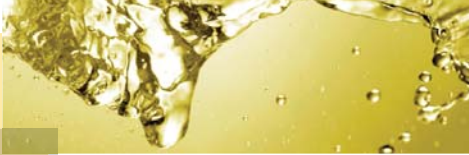
Visit [www.thermoscientific.com/WAI-Library](http://www.thermoscientific.com/WAI-Library) for our EPA letters and methods.

## Specifications

| Specifications                             | Description  |
|--|--|
| Display                                    | LCD  |
| Keys                                       | Power, mode, zero, read/enter                                    |
| Sample Requirement                         | 10 mL  |
| Light Shield Cover Over Vial for Measuring | Not needed   |
| Power with Auto Shutoff                    | 4 x AAA, >3000 tests   |
| Regulatory Approvals                       | CE, TUV for US and Canada, FCC part 15                           |
| Warranty                                   | 2 years  |
| Operating Range                            | 0 to 50 °C, 0 to 90 % relative humidity, non-condensing at 30 °C |
| Test Parameter Ranges                      |  |
| Free Chlorine                              | 0.02 to 4.0 mg/L;<br>US EPA range 0.03 to 2.0 mg/L               |
| Total Chlorine                             | 0.02 to 4.0 mg/L;<br>US EPA range 0.03 to 2.0 mg/L               |
| Chlorine Dioxide                           | 0 to 11.4 mg/L   |
| pH   | 5.9 to 8.2 pH  |
| Cyanuric Acid                              | 5 to 90 mg/L   |

## Ordering Information

| Cat. No. | Description                                   | Contents  |
|----------|---|---|
| AQ3070   | Orion III chlorine meter kit                  | Meter, 6 sample vials, AC4P71 free chlorine, AC4P72 total chlorine, batteries, vial cleaning brush, tablet tamping stir rod, user guide, MSDSs, and carrying case |
| AC4P71   | AQUAfast AC4P71 free chlorine powder packets  | 100 tests   |
| AC4P72   | AQUAfast AC4P72 total chlorine powder packets | 100 tests   |
| AC2099   | Chlorine dioxide tablets                      | 100 tests   |
| AC3001   | pH, 2 x 15 mL dropper bottles                 | 60 tests  |
| AC2098   | Cyanuric acid, tablets                        | 100 tests   |
| AC3V25   | Replacement 25 mm vials, pack of 3            | 3 vials   |
| AC3ROD   | Replacement tablet tamping stir rod           | 1 package of 10   |
| AC3CBB   | Replacement vial cleaning brush               | 1 package of 5  |



## Thermo Scientific Orion AQ4500 Turbidity Meter

The AQ4500 features both White and Infrared light sources – so this is the only meter you need for all of your turbidity testing.

**The AQ4500 turbidimeter has dual source LED that allows readings that comply with reporting requirements for both EPA and ISO 7027 methodologies.**

- Nephelometric and ratiometric measurements with autoranging
- IR mode options for measurement of wines and colored samples
- Data log capacity of up to 100 data points
- Reading ranges vary from 0 to 4000 with appropriate units based on test selected
- Includes turbidity standards kit, rugged carrying case, and replacement vials
- The AQ4500 is truly IP67 waterproof to a depth of 3 meters

**For drinking water, our Orion AQ4500 Method has been approved for regulatory reporting and is published in the US Federal Register.**

**For wastewater, our Orion AQ4500 Method has been approved for regulatory reporting and is published in the US Federal Register.**

**Methods are available at [www.thermofisher.com/WAI-Library](http://www.thermofisher.com/WAI-Library).**

The IR based methods meet ISO 7027 requirements. Review the measurement information in the user guide to determine the method needed.

### Specifications

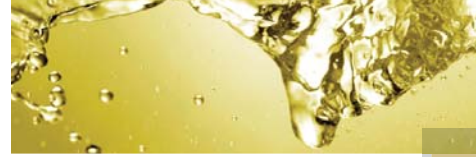
| Specifications                    | Description   |
|-----------------------------------|---|
| <b>Light Source</b>               | White LED, IR LED   |
| <b>Temperature Effect</b>         | LED temperature compensated   |
| <b>Includes Measurement Modes</b> | EPA 180.1, ISO nephelometric, ISO absorbance, IR ratiometric, % transmittance, EPA GLI method 2, EBC (European Brewing Chemists), ASBC (American Society of Brewing Chemists) |
| <b>Measurement Ranges</b>         | 0 to 4000 NTU, EPA 0 to 2000 NTU, GLI range 0 to 40 NTU, ISO-7027 0 to 150 FAU, IR Ratio 0 to 4000 NTU, EBC 0 to 24.5, ASBC 0 to 236  |
| <b>Resolution</b>                 | 0.01 (0 to 9.99 NTU), 0.1 (10 to 99.9), 1 (100 to 1000)   |
| <b>Precision</b>                  | ±2 % of reading plus 0.01 NTU from 0 to 500 NTU, ±3 % of reading from 500 to 100 NTU, ±5 % of reading from 1000 to 2000 NTU   |
| <b>Calibration Standards</b>      | Provided primary SDVB standards   |
| <b>Sample Size Minimum</b>        | 10 mL   |
| <b>User Interface</b>             | Automatic sample measurement for each measurement with simple user interface  |
| <b>RS232</b>                      | Bidirectional   |
| <b>Datalog</b>                    | 100 points  |
| <b>Real Time Clock</b>            | Yes   |
| <b>Power</b>                      | Long life – low power consumption – about 2500 hours with 4 alkaline AA batteries or about 10000 with lithium batteries   |
| <b>Waterproof Rating</b>          | IP67  |
| <b>Warranty</b>                   | 2 years   |
| <b>Regulatory and Safety</b>      | CE, FCC part 15   |
| <b>Operating Temperatures</b>     | (-40 °C to 60 °C), 90 % relative humidity at 30.0 °C max  |

### Ordering Information

| Cat. No.      | Description  |
|---------------|--|
| <b>AQ4500</b> | Orion AQ4500 turbidimeter and calibration kit. Kit includes meter, 4 primary standards, standard and sample vials, silicone oil and cloth in carrying case |
| <b>AQ4CBL</b> | RS232 cable for data download and software updates   |
| <b>AC45FZ</b> | Formazin turbidity standard, 4000 NTU, 475 mL  |
| <b>AC45S1</b> | Silicon oil and cloth kit for AQ4500   |
| <b>AC45ST</b> | Primary turbidity calibration kit for AQ4500 meter only, replacement   |
| <b>AC2T24</b> | 24 mm replacement turbidity only vials, 12 pack  |



AQ4500 Kit



# Thermo Scientific Orion AQ3010 Turbidity Meter



**AQ3010 Meter Kit**

- Ergonomic IP67 turbidity meter for lab or field use
- Uses Nephelometric principle with 90 ° detection
- In most locations a separate light cap or shield is not needed
- Meets ISO 7027 and offers consistent light source for greater accuracy
- Easy vial indexing with continuous measurement mode
- No mixing or diluting with polymer bead primary standards for faster calibration
- Three year warranty

The Orion AQ3010 Turbidity Meter makes it easy to determine the clarity of your sample with one keystroke and without an extra light shield cap in many environments. With autoranging from 0 - 1000 NTUs, this small waterproof portable meter is very easy to use, plus features a large easy-to-read LCD display. The meter is supplied with ready-to-use, highly stable EPA-approved and ISO accepted polymer bead primary standards. Calibration is easy with step-by-step prompts with the option to choose which points to calibrate. The standards can be used for a calibration check at any time, verifying that your readings are accurate.

The Orion AQ3010 meter comes with everything you need in a field case for easy storage and transport. This meter is covered by a 3 year warranty!

**Make your job easier!**

Visit our new applications webpage at <http://www.thermoscientific.com/waterapps> for regulatory links, methods, applications and technical information.

**Specifications**

| Specifications                            | Description  |
|---|--|
| Display                                   | LCD  |
| Keys                                      | Power, cal, scroll up, scroll down, read/enter                   |
| Automatic Range Selections and Resolution | 0.01 to 19.99 NTU with 0.01 NTU resolution                       |
|   | 20.0 to 99.9 NTU with 0.1 NTU resolution                         |
|   | 100-1000 NTU with 1 NTU resolution                               |
| Precision                                 | ±2 % of reading<br>±1 LSD for 0-500 NTU                          |
|   | ±3 % of reading<br>±1 LSD for 501-1000 NTU                       |
|   |  |
| Response Time                             | <6 seconds   |
| Sample Requirement                        | 10 mL  |
| Included Calibration Standards            | 0.02, 20.0, 100, and 800 NTU                                     |
| Sample Vials                              | 25 mm diameter with indexing mark                                |
| Light Source                              | IR LED for ISO 7027 turbidity measurement                        |
| Power                                     | 4 x AAA >3000 tests<br>(4 x AAA lithium >12000 tests)            |
| Battery Conservation Feature              | Auto shutoff after 20 minutes of inactivity                      |
| Ambient Operating Temperature             | 0 to 50 °C (0 to 90 % non-condensing relative humidity at 30 °C) |
| Self Diagnostics                          | Yes, with troubleshooting error codes                            |
| Waterproof Rating                         | IP67   |
| Regulatory Approvals                      | CE, TUV 3-in-1 for CSA-US, FCC part 15                           |
| Warranty                                  | 3 year   |

**Ordering Information**

| Cat. No. | Description  | Contents   |
|----------|--|--|
| AQ3010   | Orion turbidity meter kit  | Meter, set of EPA-approved polymer-based primary turbidity standards, batteries, light shield cover, seven vials, lint-free cloth, silicone oil, MSDS and user guide |
| AC301S   | Replacement set of EPA-approved and ISO accepted polymer-based primary turbidity standards | 60 mL bottle of 0.02, 20.0, 100, and 800 NTU   |
| AC3SIL   | Replacement silicone oil and cloth   | 1 bottle of silicone oil and one cloth   |
| AC3V25   | Replacement 25 mm vials, pack of 3   | 3 empty 25 mm vials with caps  |
| AC3CBR   | Replacement vial cleaning brush  | Brush, package of 5  |

## Thermo Scientific Orion COD Test Systems

COD testing correlated to BOD readings can save time and money



AQ4000 Meter

The AQ4000 and AQ3700 colorimeters support additional tests, including chlorine, nitrite and ammonia (see pages 123-125).

- Ideal for environmental and wastewater monitoring with EPA accepted methods
- Three ranges of COD reagents
- COD reactor can digest up to 25 samples simultaneously in 2 hours or less and meet fast COD temperature requirements
- Works with the new AQ3700 multiparameter colorimeter or the AQ4000 advanced colorimeter

Just add the sample to the COD vial, digest sample in the reactor and read results with your Orion colorimeter.

### The AQ4000 and AQ3700 Colorimeters Offer:

- Pre-programmed methods for water quality testing
- Multiple wavelength and more test options
- Datalogging and GLP features
- Bidirectional RS232 interface on AQ4000
- IR Interface on AQ3700 (IRDA required)
- Compatibility with 13, 16 and 24 mm diameter vials
- IP67 waterproof housing
- 2 year warranty

Please visit [www.thermoscientific.com/water](http://www.thermoscientific.com/water) for more product, methods information and method approval letters from EPA.

### Select One Meter

| Cat. No. | Description   |
|----------|---|
| AQ4000   | Orion AQ4000 advanced colorimeter with COD                            |
| AQ3700   | Orion AQ3700 colorimeter with COD, total nitrogen and total phosphate |

### Order Digestor

| Cat. No. | Description   |
|----------|---|
| COD165   | Orion thermoreactor for digestion methods to 165 °C |

### Select Your Test Reagents by Range and Quantity

| Cat. No. | Range          | No. of Vials | EPA Approved   |
|----------|----------------|--------------|----------------|
| CODL00   | 0 to 150 ppm   | 25           | Yes            |
| CODH00   | 0 to 1500 ppm  | 25           | Yes            |
| CODHPO   | 0 to 15000 ppm | 25           | No requirement |

### Select a Standard

| Cat. No. | Description                             |
|----------|---|
| CODS01   | AQUAfast 1000 ppm COD standard, 475 mL  |
| CODS10   | AQUAfast 10000 ppm COD standard, 475 mL |



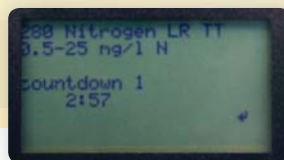
COD Reactor, Test Reagents and Standards with AQ4000 Meter



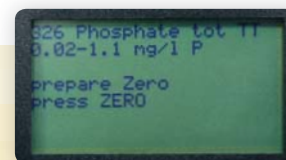
## Thermo Scientific Orion Digestion Test Reagents



Orion AQ3700 Meter



Total Nitrogen LR Test



Total Phosphate Test

### Tube Digestions for Nitrogen and Phosphate Nutrient Removal Process Monitoring

The benefit of efficient operation is important to all production facilities, no matter what they make. By optimizing the process in wastewater treatment, the dirty water can move to the next stage of the process at the perfect time – not prior to the being fully treated and not over-treated. Overtreatment wastes chemicals and slows down the processing. Undertreatment can cause problems if the discharge does not meet the permit levels. Typically total nitrogen and total phosphate and other digestions were very long reflux processes with expensive glassware. Now the results can be ready in an hour or so using persulfate digestion tube methods. This greatly improves the turnaround time for the results. These in process checks of the nutrient removal status can ensure you are on track for the final levels you need to attain or give you timely information to correct the process.

With the AQ3700 meter, total nitrogen and total phosphate tube digestion tests are now available. The kit includes the reagents and accessories for the test.

If you are already testing COD levels, you can quickly add these important tests and start reaping the benefits!

### Overview of Nitrogen and Phosphorus Methods

- Persulfate digestion for nitrogen; persulfate/ascorbic acid digestion for phosphorus
- Nitrogen tests require two tubes – one for a blank and one for the test; phosphate test needs just one tube for the blank and test
- 100 °C digestion temperature for 30 minutes and let cool about 10 more minutes for additional reagent reaction times
- Orion COD 165 digester has the temperatures needed for nitrogen and phosphate tests, see page 122

### Nitrogen

| Cat. No. | Description                                 | Quantity |
|----------|---|----------|
| ACD004   | Total nitrogen LR reagents (0.5 to 25 mg/L) | 50 tests |
| ACD007   | Total nitrogen HR reagents (5 to 150 mg/L)  | 50 tests |

### Phosphate

| Cat. No. | Description                                   | Quantity |
|----------|---|----------|
| ACD095   | Total phosphorous reagents (0.02 to 1.1 mg/L) | 50 tests |

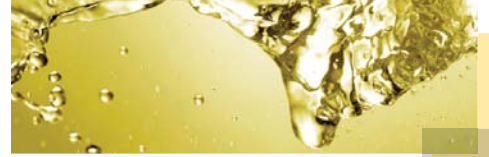
# Thermo Scientific Orion AQUAfast Colorimeter Reagent Chemistries



## Colour Codes

■ Tablet    
 ■ Liquid    
 ■ Powder    
 ■ Auto-Test Ampoule

| Parameter                 | Reagent Type      | Catalog Number | Description  | Range                               | Method                     | Number of Tests | Meter Models                   | EPA Approved Methods              |
|---------------------------|-------------------|----------------|--|-------------------------------------|----------------------------|-----------------|--------------------------------|-----------------------------------|
| <b>Alkalinity-m</b>       | Tablet            | AC2002         | AQUAfast II alkalinity-m   | 5.0 - 200 mg/L                      | Acid/indicator             | 100             | AQ4000, AQ3700, AQ2001         | –                                 |
| <b>Aluminum</b>           | Auto-Test Ampoule | AC4027         | AQUAfast IV aluminum   | 0.04 - 0.25 mg/L                    | Eriochrome cyanine R       | 30              | AQ4000                         | WWV equivalent                    |
|                           | Tablet            | AC2027         | AQUAfast II aluminum   | 0.05 - 0.30 mg/L                    | Eriochrome cyanine R       | 50              | AQ4000, AQ3700, AQ2005, AQ2020 | WWV equivalent                    |
| <b>Ammonia (Nitrogen)</b> | Powder            | AC4P12         | AQUAfast ammonia-nitrogen, powder  | 0.1 - 0.50 mg/L                     | Salicylate                 | 100             | AQ4000, AQ3700                 | –                                 |
|                           | Auto-Test Ampoule | AC4010         | AQUAfast IV ammonia (ultra low range)  | 0.10 - 3.0 mg/L                     | Salicylate                 | 30              | AQ4000                         | –                                 |
|                           | Auto-Test Ampoule | AC4012         | AQUAfast IV ammonia (low range)  | 0.5 - 7.0 mg/L                      | Nesslerization             | 30              | AQ4000                         | WWV equivalent                    |
|                           | Auto-Test Ampoule | AC4011         | AQUAfast IV ammonia (high range)   | 1.0 - 14 mg/L                       | Nesslerization             | 30              | AQ4000                         | WWV equivalent                    |
|                           | Tablet            | AC2012         | AQUAfast II ammonia, as nitrogen   | 0.05 - 1.0 mg/L;<br>0.5 - 10.0 mg/L | Indophenole/phenate        | 50              | AQ4000, AQ3700, AQ2004         | WWV equivalent                    |
| <b>Bromine</b>            | Tablet            | AC2035         | AQUAfast II bromine  | 0.1 - 13.5 mg/L                     | DDPD                       | 100             | AQ3700, AQ2005                 | No requirement                    |
| <b>Chloride</b>           | Auto-Test Ampoule | AC4017         | AQUAfast IV chloride   | 2.0 - 40 mg/L                       | Mercuric nitrate           | 30              | AQ4000                         | –                                 |
|                           | Tablet            | AC2017         | AQUAfast II chloride   | 0.5 - 25 mg/L                       | Silver nitrate/turbidity   | 50              | AQ4000, AQ3700, AQ2005         | –                                 |
| <b>Chlorine Dioxide</b>   | Auto-Test Ampoule | AC4099         | AQUAfast IV chlorine dioxide   | 0.80 - 12 mg/L                      | DPD                        | 30              | AQ4000                         | No requirement                    |
|                           | Tablet            | AC2099         | AQUAfast II chlorine dioxide   | 0.04 - 2.8 mg/L                     | DPD                        | 100             | AQ4000, AQ3070, AQ3700, AQ2020 | No requirement                    |
| <b>Chlorine</b>           | Powder            | AC4P71         | AQUAfast chlorine, free, DPD, powder packets, EPA-approved method            | 0.03 - 2.00 mg/L                    | DPD                        | 100             | AQ4000, AQ3070, AQ3700         | DW                                |
|                           | Powder            | AC4P71B        | AQUAfast chlorine, free, powder packets bulk packaging, EPA-approved method  | 0.03 - 2.00 mg/L                    | DPD                        | 1000            | AQ4000, AQ3070, AQ3700         | DW                                |
|                           | Tablet            | AC2071         | AQUAfast II chlorine, DPD, free only   | 0.05 - 6.0 mg/L                     | DPD                        | 100             | AQ4000, AQ2070, AQ3700         | –                                 |
|                           | Auto-Test Ampoule | AC4070         | AQUAfast IV chlorine, free and total, EPA-approved method                    | 0.05 - 6.0 mg/L                     | DPD                        | 30              | AQ4000                         | DW                                |
|                           | Tablet            | AC2070         | AQUAfast II chlorine, free and total   | 0.05 - 6.0 mg/L                     | DPD                        | 50 each         | AQ4000, AQ3700, AQ2070, AQ2020 | –                                 |
|                           | Powder            | AC4P72         | AQUAfast chlorine, total, DPD, powder packets, EPA-approved method           | 0.03 - 2.00 mg/L                    | DPD                        | 100             | AQ4000, AQ3070, AQ3700         | DW & WWV                          |
|                           | Powder            | AC4P72B        | AQUAfast chlorine, total, powder packets bulk packaging, EPA-approved method | 0.03 - 2.00 mg/L                    | DPD                        | 1000            | AQ4000, AQ3070, AQ3700         | DW & WWV                          |
|                           | Tablet            | AC2072         | AQUAfast II chlorine, total, EPA-approved method                             | 0.05 - 6.0 mg/L                     | DPD                        | 50              | AQ4000, AQ3700, AQ2070         | DW & WWV                          |
| <b>Copper</b>             | Powder            | AC4P29         | AQUAfast copper, bicinchoninate, powder                                      | 0.05 - 5.00 mg/L                    | Bicinchoninate             | 100             | AQ4000, AQ3700                 | WWV equivalent                    |
|                           | Auto-Test Ampoule | AC4029         | AQUAfast IV copper (soluble)   | 0.5 - 12 mg/L                       | Bathocuproine              | 30              | AQ4000                         | WWV equivalent                    |
|                           | Tablet            | AC2065         | AQUAfast II zinc/copper  | 0.02 - 1.0 mg/L                     | Zincon                     | 50              | AQ4000, AQ3700, AQ2002         | –                                 |
|                           | Tablet            | AC2029         | AQUAfast II copper   | 0.05 - 5.0 mg/L                     | Biquinoline                | 50              | AQ4000, AQ3700, AQ2005         | –                                 |
| <b>Cyanide</b>            | Auto-Test Ampoule | AC4006         | AQUAfast IV cyanide (free)   | 0.20 - 0.50 mg/L                    | Pyridine-barbituric acid   | 30              | AQ4000, AQ3700                 | ETV verified, DW & WWV equivalent |
| <b>Cyanuric Acid</b>      | Tablet            | AC2098         | AQUAfast II cyanuric acid  | 5 - 90 mg/L                         | Melamine                   | 100             | AQ3070, AQ3700, AQ2003         | –                                 |
| <b>Fluoride</b>           | Liquid            | AC2009         | AQUAfast II fluoride SPADNS kit, EPA-approved method                         | 0.05 - 2.0 mg/L                     | SPADNS                     | 50              | AQ4000, AQ3700, AQ2009, AQ2020 | DW & WWV                          |
| <b>Hydrazine</b>          | Tablet            | AC2030         | AQUAfast II hydrazine kit  | 0.05 - 0.50 mg/L                    | Dimethylamino-benzaldehyde | 100             | AQ4000, AQ3700, AQ2003         | No requirement                    |



| Parameter | Reagent Type      | Catalog Number | Description                                    | Range                             | Method                             | Number of Tests | Meter Models              | EPA Approved Methods |
|-----------|-------------------|----------------|--|-----------------------------------|------------------------------------|-----------------|---------------------------|----------------------|
| Iron      | Powder            | AC4P79         | AQUAfast iron total TPTZ, powder               | 0 - 1.80 mg/L                     | TPTZ                               | 100             | AQ4000, AQ3700            | –                    |
|           | Powder            | AC4P78         | AQUAfast iron total ferro, powder              | 0 - 3.00 mg/L                     | 1,10 Phenanthroline                | 100             | AQ4000, AQ3700            | WW equivalent        |
|           | Auto-Test Ampoule | AC4078         | AQUAfast IV iron 1 (total & soluble)           | 0.45 - 7.0 mg/L                   | 1,10 Phenanthroline                | 30              | AQ4000                    | WW equivalent        |
|           | Tablet            | AC2078         | AQUAfast II iron                               | 0.02 - 1.0 mg/L;<br>0.2 - 10 mg/L | TPTZ                               | 100             | AQ4000, AQ3700,<br>AQ2005 | –                    |
| Manganese | Powder            | AC4P55         | AQUAfast manganese HR, powder                  | 0.2 - 20.0 mg/L                   | Periodate oxidation                | 100             | AQ4000, AQ3700            | WW equivalent        |
|           | Auto-Test Ampoule | AC4055         | AQUAfast IV manganese                          | 1.0 - 30 mg/L                     | Periodate oxidation                | 30              | AQ4000, AQ3700            | WW equivalent        |
|           | Tablet            | AC2055         | AQUAfast II manganese                          | 0.05 - 4 mg/L                     | Formaloxime                        | 50              | AQ4000, AQ3700,<br>AQ2003 | –                    |
| Molybdate | Powder            | AC4P42         | AQUAfast molybdenum, molybdate, HR, powder     | 0 - 40.0 mg/L                     | Mercaptoacetic acid                | 100             | AQ4000, AQ3700            | –                    |
| Nitrate   | Auto-Test Ampoule | AC4007         | AQUAfast IV nitrate 3 (as NO <sub>3</sub> )    | 5.0 - 50 mg/L                     | Cadmium reduction                  | 30              | AQ4000                    | DW & WW equivalent   |
|           | Auto-Test Ampoule | AC4005         | AQUAfast IV nitrate 2 (as N)                   | 0.40 - 3.0 mg/L                   | Cadmium reduction                  | 30              | AQ4000                    | DW & WW equivalent   |
|           | Auto-Test Ampou   | AC4004         | AQUAfast IV nitrate (as N) LR                  | 0.20 - 1.5 mg/L                   | Cadmium reduction                  | 30              | AQ4000                    | DW & WW equivalent   |
|           | Tablet            | AC2007         | AQUAfast II nitrate                            | 1 - 40 mg/L                       | Zinc reduction                     | 50              | AQ4000, AQ3700,<br>AQ2007 | –                    |
| Nitrite   | Powder            | AC4P46         | AQUAfast nitrite LR, powder                    | 0 - 0.350 mg/L                    | Diazotization (Azo)                | 100             | AQ4000, AQ3700            | DW & WW equivalent   |
|           | Auto-Test Ampoule | AC4046         | AQUAfast IV nitrite                            | 0.080 - 0.80 mg/L                 | Diazotization (Azo)                | 30              | AQ4000                    | DW & WW equivalent   |
|           | Tablet            | AC2046         | AQUAfast II nitrite, EPA-approved method       | 0.05 - 0.50 mg/L                  | Diazotization (Azo)                | 100             | AQ4000, AQ3700,<br>AQ2046 | DW & WW              |
| Oxygen    | Auto-Test Ampoule | AC4008         | AQUAfast IV oxygen                             | 2.0 - 15 mg/L                     | Azo dye                            | 30              | AQ4000                    | –                    |
| Ozone     | Auto-Test Ampoule | AC4048         | AQUAfast IV ozone                              | 0.20 - 2.5 mg/L                   | DDPD                               | 30              | AQ4000                    | –                    |
|           | Tablet            | AC2048         | AQUAfast II ozone                              | 0.05 - 0.5 mg/L                   | DPD/glycine                        | 100             | AQ3700, AQ2001            | –                    |
| pH        | Liquid            | AC3001         | AQUAfast II pH, dropper bottle                 | 5.9 - 8.2                         | Phenol red                         | 30              | AQ3070, AQ3700            | –                    |
|           | Tablet            | AC2001         | AQUAfast II pH                                 | 6.5 - 8.4                         | Phenol red                         | 100             | AQ4000, AQ3700,<br>AQ2001 | –                    |
| Phosphate | Powder            | AC4P95         | AQUAfast phosphorus 3, powder                  | 0.07 - 2.5 mg/L                   | Phosphomolybdic blue/ascorbic acid | 100             | AQ4000, AQ3700            | DW & WW equivalent   |
|           | Auto-Test Ampoule | AC4095         | AQUAfast IV phosphate 2-LR                     | 0.75 - 8.0 mg/L                   | Stannous chloride                  | 30              | AQ4000, AQ3700            | –                    |
|           | Tablet            | AC2096         | AQUAfast II phosphorus HR                      | 10 - 100 mg/L                     | Phosphomolybdic blue/ascorbic acid | 50              | AQ4000, AQ3700,<br>AQ2003 | DW & WW equivalent   |
|           | Tablet            | AC2095         | AQUAfast II phosphorus LR, EPA approval method | 0.05 - 4.0 mg/L                   | Vanado molybdate                   | 50              | AQ4000, AQ3700,<br>AQ2004 | DW & WW              |
| Silica    | Powder            | AC4P60         | AQUAfast silica HR, powder packets             | 1.0 - 75.0 mg/L                   | Silicomolybdate                    | 100             | AQ4000, AQ3700            | DW & WW equivalent   |
|           | Auto-Test Ampoule | AC4060         | AQUAfast IV silica                             | 1.0 - 14 mg/L                     | Heteropoly blue                    | 30              | AQ4000                    | DW equivalent        |
|           | Powder            | AC2061         | AQUAfast II silica phosphate removal           | NA                                | NA                                 | 100             | AQ4000, AQ3700,<br>AQ2002 | –                    |
|           | Tablet            | AC2060         | AQUAfast II silica                             | 0.05 - 4.0 mg/L                   | Silicomolybdate                    | 50              | AQ4000, AQ3700,<br>AQ2002 | DW & WW equivalent   |
| Sulfate   | Powder            | AC4P82         | AQUAfast sulfate 4, powder packets             | 2 - 70 mg/L                       | Barium sulfate/<br>turbidity       | 100             | AQ4000, AQ3700            | DW & WW equivalent   |
|           | Auto-Test Ampoule | AC4082         | AQUAfast IV sulfate                            | 8.0 - 100 mg/L                    | Barium sulfate/<br>turbidity       | 30              | AQ4000                    | DW & WW equivalent   |
|           | Tablet            | AC2082         | AQUAfast II sulfate                            | 5 - 200 mg/L                      | Barium sulfate/<br>turbidity       | 100             | AQ4000, AQ3700,<br>AQ2005 | DW & WW equivalent   |
| Sulfide   | Auto-Test Ampoule | AC4016         | AQUAfast IV sulfide (soluble)                  | 0.3 - 3.0 mg/L                    | Methylene blue                     | 30              | AQ4000                    | WW equivalent        |
|           | Tablet            | AC2016         | AQUAfast II sulfide                            | 0.05 - 0.50 mg/L                  | Methylene blue                     | 50              | AQ4000, AQ3700,<br>AQ2004 | WW equivalent        |
| Zinc      | Auto-Test Ampoule | AC4065         | AQUAfast IV zinc                               | 0.30 - 3.0 mg/L                   | Zincon                             | 30              | AQ4000                    | WW equivalent        |
|           | Tablet            | AC2065         | AQUAfast IV zinc/copper                        | 0.02 - 1.0 mg/L                   | Zincon                             | 50              | AQ4000, AQ3700,<br>AQ2002 | WW equivalent        |

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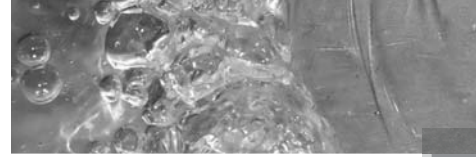
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\* For the latest information on these products, visit [www.thermoscientific.com/water](http://www.thermoscientific.com/water)

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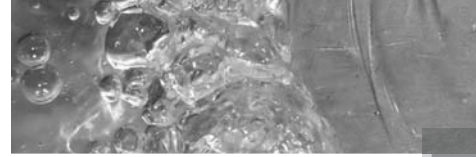
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# Thermo Scientific Orion Service Program Options

Our leadership shows up in everything we do including:

- Minimized ramp up time
  - Ongoing support
- Flexible data reporting and analysis
- Low cost of ownership
- Comprehensive support solutions for all phases of the product life cycle
  - Immediate access to experts worldwide



**Service Programs:** Flexible service programs provide fixed-price solutions, offering benefits over the traditional time and materials, per-quote based model. So you get improved ROI, minimized downtime, unmatched flexibility, better staff utilization and increased productivity.

- Maintenance, Calibration and Validation • Training • Start-Up and Application Assistance • Field Service (Where Applicable)

**Product Service Options:** A variety of service options are now available for all products to get you up and running quickly and to make sure you continue to operate at the highest performance possible. Set-up services and training options are available to minimize ramp up time so results are expedited rapidly and accurately. Avoid downtime by choosing a preventative maintenance program that meets your high demands for quality and accurate results, or select a two or three year extended warranty to ensure you are minimizing the possibility of downtime due to an unforeseen failure.

### Product Service Options

| Qualified Systems  | Description                   | Specialized Maintenance programs | Start-Up | Calibration and Validation | IQOQ |
|--|-------------------------------|----------------------------------|----------|----------------------------|------|
| AF8 and Turbo II   | Karl Fischer Titrators        | •                                | •        | •                          | •    |
| Orion Star, Orion Star Plus, Orion Star A and Orion VERSA STAR | Portable and Bench-Top Meters | •                                | N/A      | •                          | •    |
| Auto Samplers  | Automatic Sampling Systems    | •                                | N/A      | •                          | N/A  |
| 10060020   | BOD AutoEZ                    | •                                | •        | •                          | N/A  |

**Service Contracts – Contracts for Start-up and Training are available in North America only.**

**Specialized Maintenance Programs – Are available world wide.**

**Call or E-mail our Technical Service Team for more information and current prices for any programs required to assure trouble-free long term performance.**

### “Orion Star, Orion Star Plus, Orion Star A and Orion VERSA STAR” Series Service Options, Calibration and Validation:

You'll feel confident your results are accurate and exact when taking advantage of our calibration and validation options. We have a range of testing, validation and calibration programs to satisfy even the most exacting standard. Our dedicated validation and calibration consultants offer in-depth expertise and a full understanding of compliance requirements. It is recommended that these options be performed annually, based on your application demands.

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**IQ/OQ Package:** Save time and money when you purchase the IQ/OQ package to ensure that your meter performs to the manufacturer's published specifications. Full IQ/OQ documentation is available for the Orion Star series meters to perform a comprehensive installation and operation on your meter and satisfy the requirements of regulated industries such as pharmaceutical.

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The specifications, descriptions, drawings, ordering information and part numbers within this document are subject to change without notice.

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